MILL SECTION of

Concrete

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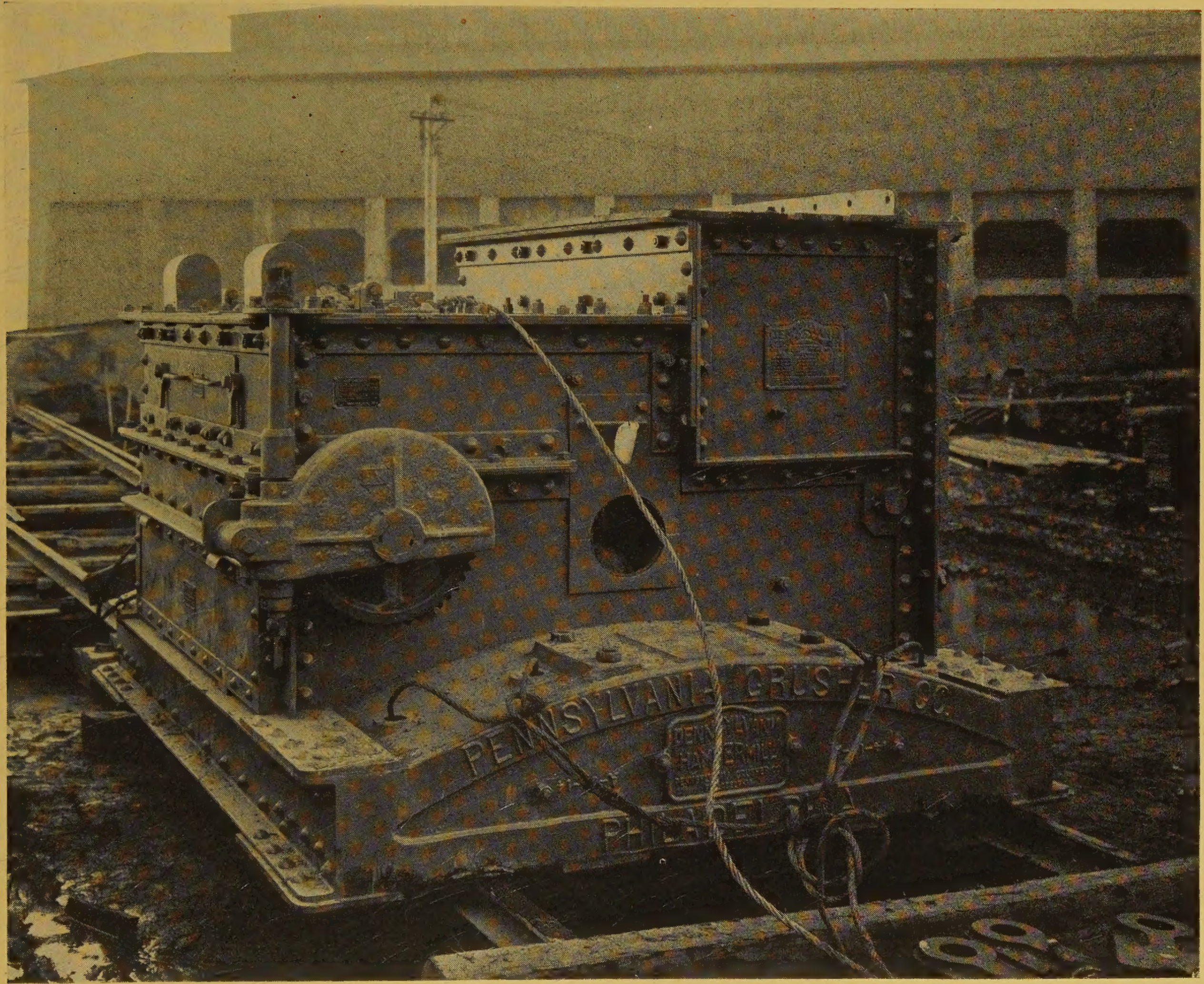

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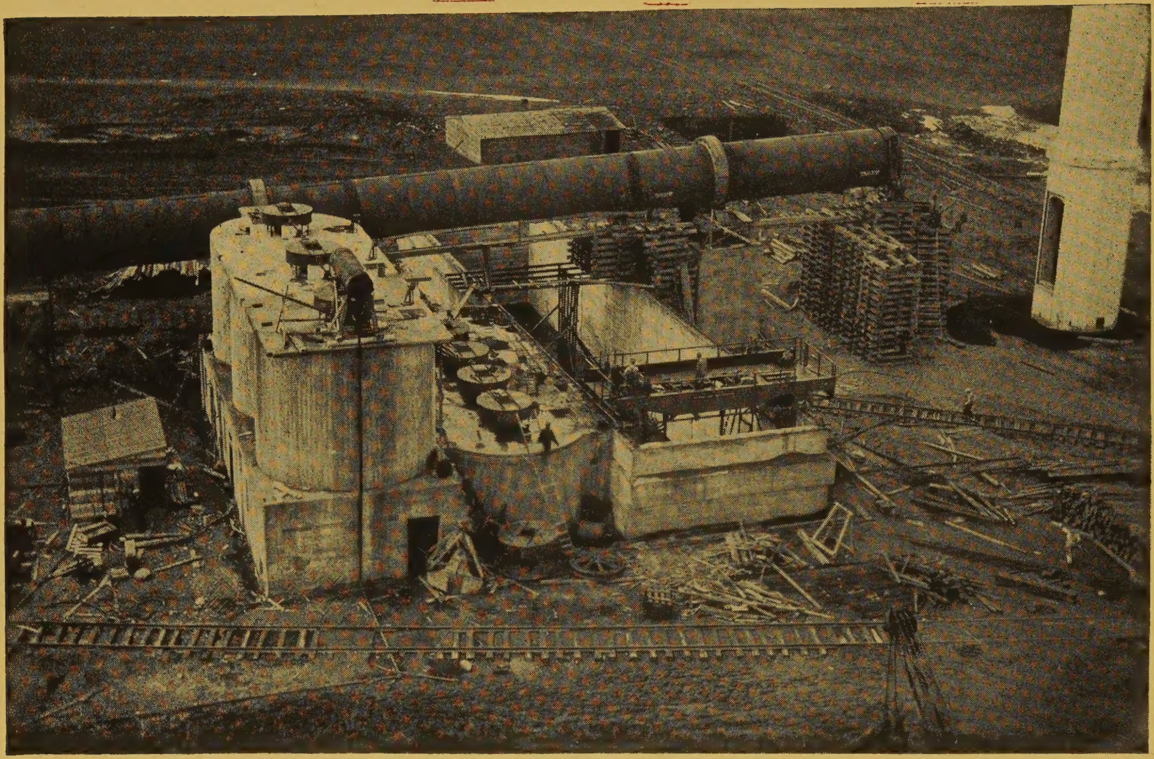
AGITATORS

FOR CEMENT SLURRY



The illustration shows a typical installation of a SMIDTH agitating system for a one or two kiln wet process cement plant.

From the grinding machinery the slurry is delivered to the three-unit correcting basin. Each unit of the basin has a capacity of 600 barrels finished weight.

From the correcting basin, the material is tapped in the correct proportion and flows by gravity to the quadruple mix basin which holds about 2000 barrels. In this basin it should have the correct composition.

By means of a patented arrangement, the slurry passes, by bottom to top overflow, from the mix basin to the storage basin, which, in this case, is equipped with a traveling agitator. The basin illustrated holds slurry for 7500 barrels of cement.

The basins may be made of various sizes and placed differently in relation to each other than shown to suit the general arrangement of the plant.

The slurry is agitated mechanically and by means of air blown through nozzles located on the lower agitating arms.

Thorough mixing, complete chemical control, low horsepower consumption, low maintenance costs and large storage capacity, combined with utility of space are the advantages of the SMIDTH system.

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MILL SECTION of Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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MILL SECTION of

Concrete

Vol. 33 Chicago, November, 1928 No. 5

What Organized Safety Work Has Done for the Cement Industry

A Review of Accident Prevention Accomplishments in the Cement Industry with Particular Reference to the Record of the International Group of Plants—A Paper Presented at the Seventeenth Annual Safety Congress

By E. POSSELT
Vice-President, International Cement Corporation, New York City

THE Seventeenth Annual Safety Congress of the National Safety Council was held for five days beginning October 1st, at New York City. The size of the gathering was of such proportions that five hotels were needed to cope with the need for space.

More than a small part in this meeting was played by the cement and quarry sessions which were held at the Hotel McAlpin on October 2nd, and recognition of its effective safety work was accorded the cement industry in the election of a cement mill man to the presidency of the organization.

The quarry sessions began the day. One of the most valuable papers presented at that time was that by J. R. Davis, assistant to the vice-president of the United States Gypsum Company, entitled "The Company Executive in Charge of Operations Talks Accident Prevention." This paper dealt with the elimination of accident prevention red tape, and was followed by the most spirited discussions of the meeting.

The last event at this session was the election of officers for the ensuing year, as follows: R. E. Colville, U. S. Gypsum Co., chairman; F. F. McLaughlin, Rock-Cut Stone Co., vice-chairman; J. R. Boyd, National Crushed Stone Association, secretary. Committee chairmen named were: Poster Committee, H. F. Yotter, General Crushed Stone Co.; Statistics Committee, W. W. Adams, U. S. Bureau of Mines; Membership Committee, D. S. Souder, France Stone Co.

In addition to the officers, who are also members of the executive committee, the latter will include representatives of five other organizations who will assist the quarry section in its work, as follows: A. J. R. Curtis, Portland Cement Association; Otho M. Graves, president, National Crushed Stone Association; Warren S. Hayes, secretary, National Slate Association; V. P. Ahearn, secretary, National Sand and Gravel Association, and N. S. Greensfelder, editor, "Explosives Engineer."

Simultaneously with the quarry session was held the meeting of the cement section, at which Chairman F. E. Town, superintendent of the Manitowoc Portland Cement Company, presided.

The first paper of the day was presented by E. Posselt, vice-president of the International Cement Corp., New York City. It is presented in full below.

The cement section re-elected F. E. Town to his position of presiding chairman. Edward Parry, of the Glens Falls Portland Cement Co., Glens Falls, N. Y., was elected vice-president, and A. J. R. Curtis, assistant to the manager, Portland Cement Association, was again elected secretary.

The following were named as committee chairmen: Program Committee, Frank Sass, Universal Portland Cement Co., Chicago; Poster Committee, R. B. Fortuin, Pennsylvania-Dixie Portland Cement Co.; Membership Committee, Major Henry A. Reninger, Lehigh Portland Cement Co., and Engineering Committee, S. L. Harrison, Vulcanite Portland Cement Co.

Major Henry A. Reninger was also elected president of the National Safety Council organization.

THE development of the cement industry in all its branches during the past 25 years has indeed been marvelous, and among the very satisfactory advancement made, safety and accident prevention rank high.

Accident prevention in the cement industry was started deliberately, not accidentally, and today it has grown until it is no incidental part of our activities.

Successful safety work requires the interest and attention of everyone in the organization from the highest official down, and the progress achieved in recent years is certainly powerful evidence of general interest.

Cement company executives who are the guardians of plants and properties have a very definite obligation to conserve and develop human equipment, which after all is the great motivating force. But, this is not only a moral obligation; it is good business—it gives big returns. A good plant, from a purely mechanical point of view, can be built in a comparatively short time. An efficient operating organization, however, requires much longer time to build up, and the most exacting efforts on the part of the executives in training the men. A broken bolt can be replaced without a great deal of difficulty; a broken arm cannot be restored to normal function except by the natural process of healing which takes a long time. It is true that if a man is injured, he may be replaced, but the training required to make a substitute proficient is usually no small item, and the change involves loss of time, hard work, and risk; with the result that the substitute, with all of our investment in him, may be no better than the man we had originally.

In many other ways as well, accidents destroy the effectiveness and morale of organizations. If one man is injured, the entire force may fear or take a dislike to certain equipment, or may even lose faith in the organization for which they are working. Frequent accidents often drive men to other work, and not infrequently very good men are lost in this way. Consequently, it is not unusual to find high accident rate coupled with a large turn-over, and in such cases it is difficult to decide whether the large turnover is due to the many accidents or the many accidents to the large turnover. Nevertheless, these two undesirable factors are closely linked together. In our own industry we notice that last year 347 out of 1143 accidents were to men employed less than six months, and 486 out of 1143 accidents occurred to men who had been employed less than a year.

Accidents are a drain on industry and a burden on society. While it is, therefore, to everyone's interest to reduce them, I hope we can succeed in convincing every individual workman that after all the great incompensible cost falls upon the injured and those who are near to and dependent upon him.

Organized Effort Necessary

To obtain the proper results in accident prevention, organized efforts are necessary, in fact essential. I would like to emphasize this statement by pointing out my own experience and observations in the plants of the International Cement Corporation. No efforts or expenses are spared to build our plants in the most substantial manner, arrange and install the equipment with every thought of safety, and provide all possible means of accident prevention. We still have a long way to go before we consider that every plant is mechanically perfect as far as safety is concerned, but I have no hesitancy in saying that at least several of our plants are as well protected as modern engineering can provide; and yet we have accidents—in fact we have suffered some very severe accidents in our most up-to-date plants. This, gentlemen, would emphasize that the personal equation cannot be controlled by machinery, and without the interest and complete cooperation of every man in the organization accidents cannot be avoided.

Now, let us see what the industry has accomplished during the last few years.

In January, 1925, lost time accidents were being suffered at the rate of 28 per one million barrels of cement produced. In July, 1928, this rate had dropped to less than 4 accidents per million barrels.

During 1925 lost time accidents averaged 212 per month. By 1927 this rate had dropped to 114 per month. For the first eight months of 1928, they have averaged 88 per month.

The accident total for the last three months has only been equal to the total for one average month two years ago. The quarter ending on June 30, which is the last one for which figures are available, shows 10 per cent fewer accidents than any previous quarter and the half year ending on the same date shows 15 per cent reduction over any previous similar annual period. Most assuredly these results are worth while, and we can see that we are getting somewhere.

The improvements in the plants and equipment have no doubt been a factor in this performance, but as I pointed out before, without the organized effort of our entire industry through the Portland Cement Association Accident Prevention Bureau, and the individual efforts of every plant, I am sure we would have had another picture to present.

Under the direction of our Committee on Accident Prevention, the association has furnished us with statistics and information of all kinds pertaining to accidents and their prevention, and has suggested various and sundry methods for the most effective efforts toward accident prevention.

All of this can only be the means toward an end, and each plant organization must after all work out its own salvation, so to speak.

Most of us are inclined to judge the performance on the total and average figures, and without a very careful analysis of all the data pertaining to a problem we may overlook some of the very important facts. This applies to the statistics which we gather on accidents, and if one is content to compare his own performance with the averages and totals of all the other plants, then he may not get as good results as are possible under his particular conditions.

As an example of what individual efforts can produce, I have prepared a table attached giving the accidents and days lost per 100,000 man hours, as tabulated by the Portland Cement Association for 1925, 1926, and 1927, and have shown the corresponding figure for the plants of the International Corporation for this same period.

For the purpose of classifying the performance, it has been customary for the last several years to divide the plants into four groups. The first quarter of the plants reporting and having the lowest accidents come in the first group, the next quarter are placed in the second group, and so on.

This classification shows in every year a very large difference between the first group and the fourth group. The table shows very forcefully the improvement during these last three years.

International Group Record

For our own plants, records are kept along the same lines as those of the association. We are very strict in the classification of accidents, and under our system and policies there is but little possibility that a lost-time accident is not properly recorded.

In 1925, none of our plants was in the first group, and our performance was not as good as the average of all of the 120 plants included in the association reports. In 1926, we had one plant in the first group, four plants in the second, two plants in the third, and only our foreign plants remained in the fourth group. It is evident that the foreign plants had a good many more accidents than domestic plants, and for this reason we urged the asso-

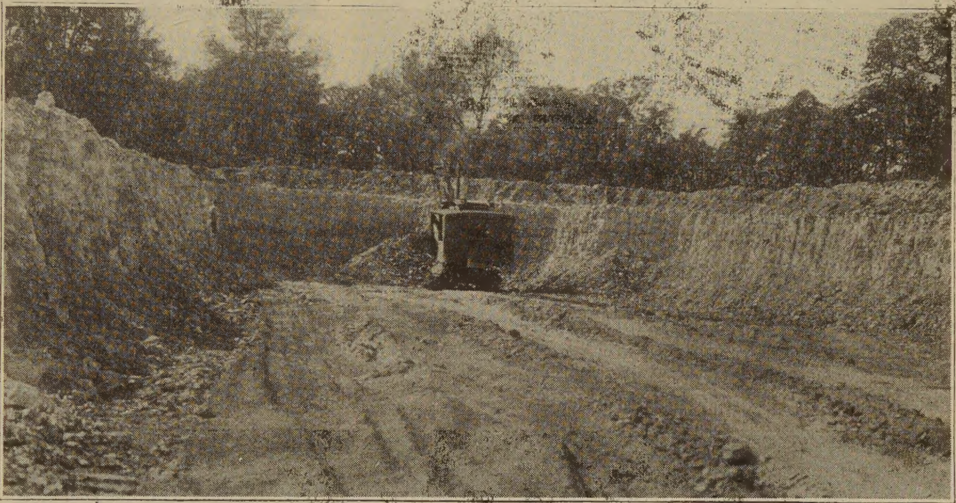
(Continued on Page 110)

Mountainside Quarry Supplies Rock for "Yosemite" Cement

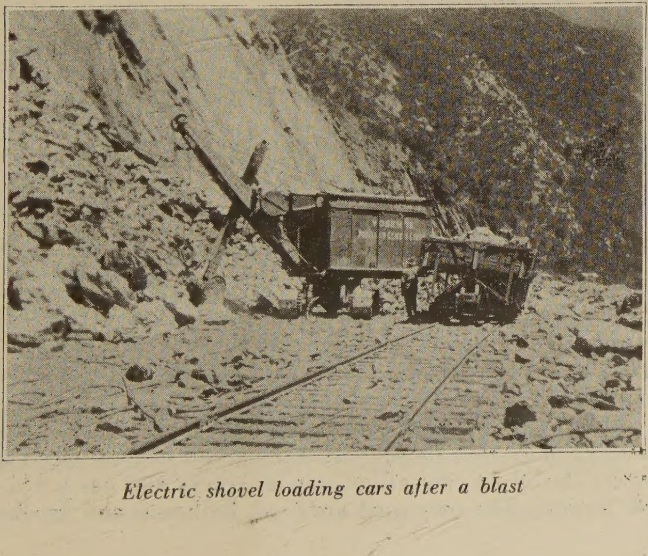
A Description of the Limestone Quarry of the Yosemite Portland Cement Corporation — Located in Mountains, 62 Miles from the Plant—Operating and Transportation Methods

By J. N. HATCH

THE plant of the Yosemite Portland Cement Corporation located about two miles northwest of the business district of the city of Merced, in the great San Joaquin Valley, is a thoroughly up-to-date and modern plant serving a wide territory. The growing demand for cement in this territory, for dams in the mountains, roads and irrigation projects in the valley, and streets and buildings in the growing cities has proved that Merced is a most favorable location for a cement plant. Situated as it is, on connections from three railroads, the shipping facilities of this company are exceptionally well provided for. There is no other cement plant in the San Joaquin Valley, the Monolith plant on the Mojave Desert south of Tehachapi being the nearest in the south and the new plant of the Calaveras Cement Company at San Andreas the nearest to the north.



Clay bank at Ione, Calif., showing electric power shovel loading material for shipment to Merced



Electric shovel loading cars after a blast

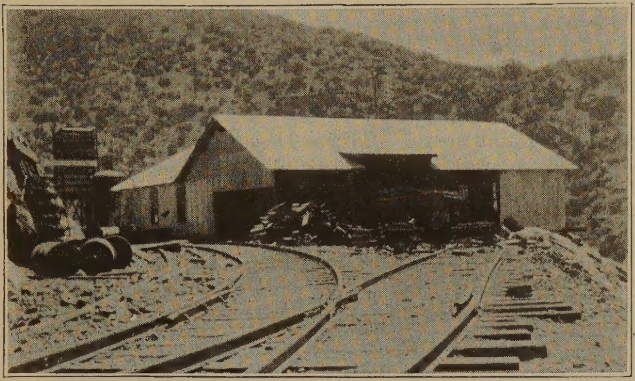
That Merced was a strategic point for the location of a cement plant was realized a number of years before the present plant was constructed. At that time a company was formed, known as the Yosemite Portland Cement Company and land was acquired and considerable machinery and equipment purchased for a cement plant and a vigorous effort was made to get the plant constructed but that company was unable to obtain the necessary financial backing and the plans lay dormant for several years.

In 1926 A. Emory Wishon, vice-president and general manager of the San Joaquin Light and Power Corporation became interested in the project and believing that Merced was a good location for a cement plant, purchased the holdings and equipment from the original owners and formed the present Yosemite Portland Cement Corporation. Through his efforts and influence the present splendid plant was built and put in operation in the fall of 1927.

Raw Material Supply Not at Plant

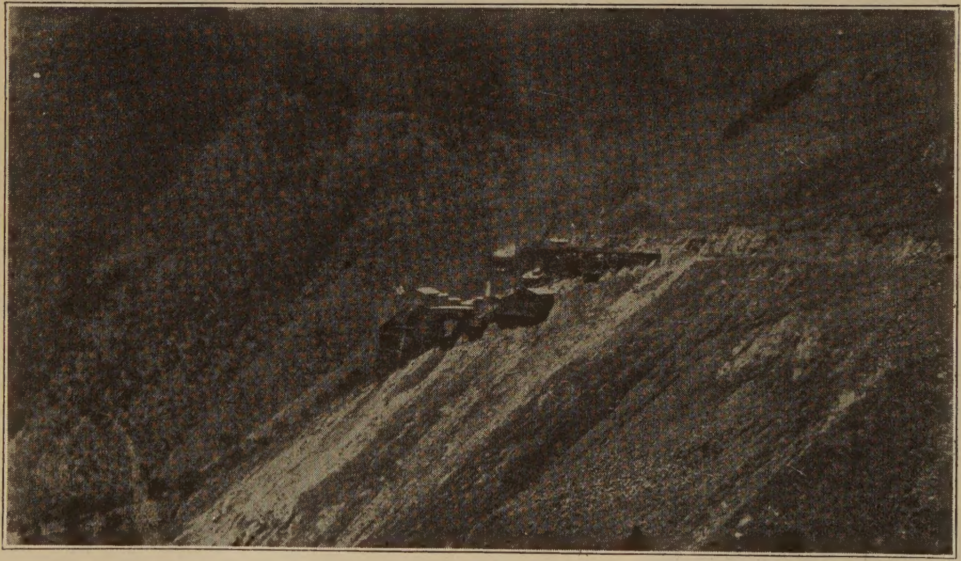
The decision to locate the plant at Merced rather than at a point near the source of raw material was on account of Merced's advantages as a distributing point for the finished product. The quarry from which the limestone is obtained is located in the Sierra Nevada Mountains not far from the bank of the Merced River about 62 miles east of Merced. The clay used is shipped from Ione, California, near Stockton and gypsum is purchased from the U. S. Gypsum Co., and delivered from their nearest distributing point. These seeming disadvantages are more apparent than real, however, as a study of the operating conditions will make plain.

The quarry is located at Emory Station on the Yosemite Valley Railroad about 62 miles east of Merced. From it is obtained the limestone required at the mill. The other ingredients needed for the manufacture of cement, as noted above, are obtained at other points. At the Emory quarry the company owns about 700 acres of land. This is all of a steep mountainous formation as may be seen from the illustrations.



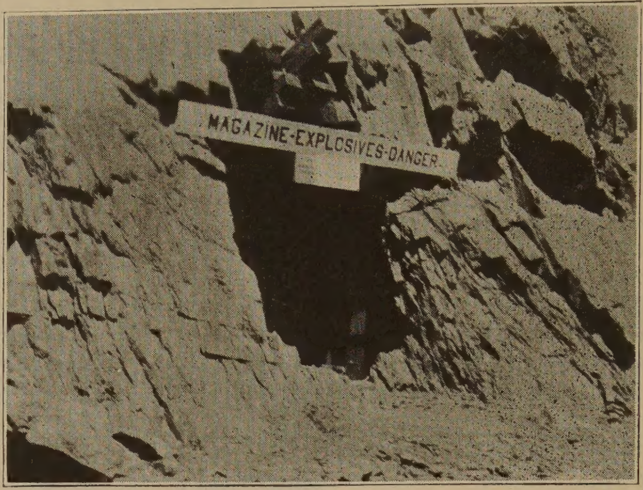
The compressor house and shops at the quarry

The office of the superintendent and his assistants is near the railroad track. A siding from the Yosemite Valley Railroad, about 1800 feet long, serves as a storage for the freight cars required for shipping to the mill. The quarry operation is really divided into four parts (1) the quarry proper, situated about a mile back from the siding, (2) a standard gauge railroad track about half a mile long from the quarry to the crusher house, (3) the crusher house and head house for the inclined railway, and (4) the incline railway for delivering the crushed rock to the loading bunkers over the railroad siding.



Compressor house and head house for incline railway

To follow the course of the stone from its natural location to the loading bunkers, let us begin with the quarry face. As this plant has been in operation only a short time, the quarry floor is still narrow and no heavy blasting is required to bring down the necessary materials.



Storage cover for explosives, as seen from the track from the quarry to the crusher house

The drilling is done with Ingersoll-Rand jackhammer air drills. Air for these hammers is furnished from the compressor house nearby in which two Ingersoll-Rand Imperial type 10, motor driven air compressors with a capacity of 750 cubic feet of air each are installed.

The quarry is being developed so that it may be worked in benches, using the present track level as the quarry floor. As soon as the face of the quarry becomes high enough to require it, well drills will be installed and heavy charges of powder used. Two caves have been excavated into the side of the hill; one for the storage of powder and the other for caps and fuses. Forty per cent and 20 per cent powder is used of the Giant and Hercules makes.

The rock as thrown down by the blasting is loaded into cars by a power shovel. This is a Marion 32 electric power shovel on caterpillar crawler trucks and has a 1¼-yd. dipper. The cars used are 6-yd. Kilbourn and Jacobs side dump cars and are run out to the crusher house in trains of five or six cars each, hauled by a Plymouth 14-ton gasoline locomotive.

The Crusher House

At the crusher house the cars are dumped into a hopper from which the rock feeds into the primary crusher which crushes the rock as it comes from the quarry down to about 8 inches in diameter and smaller. The primary crusher is an Allis-Chalmers, Superior McCully gyratory crusher driven by a 200 horsepower Westinghouse motor. From the discharge of the crusher the rock falls upon a grizzly by which it is fed to a Williams Jumbo hammermill where it is crushed down to a maximum size of about ¾ inch in diameter.

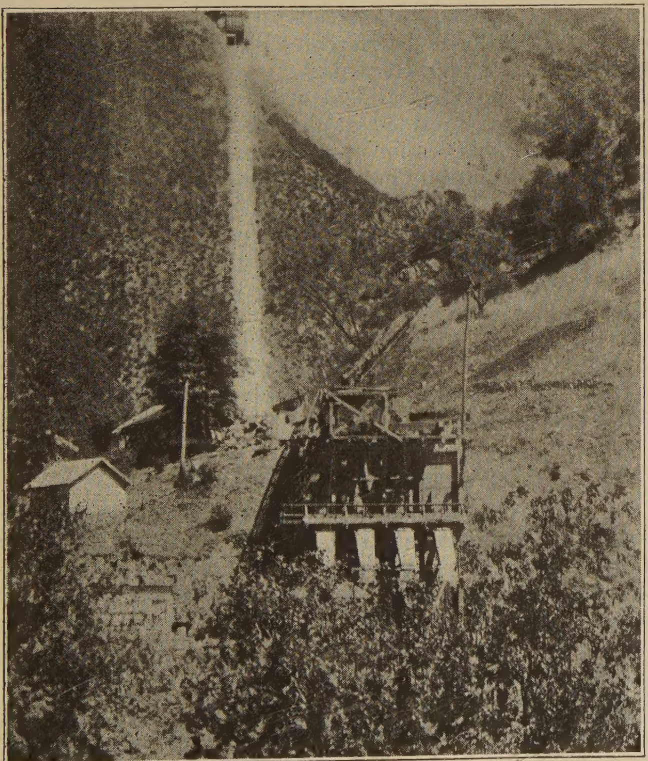
From the hammermill, the crushed rock is discharged onto a 30-in. belt conveyor which delivers it into a 800-ton bin for loading the cars of the incline railway. There are two of these cars, one ascending as the other descends. The cars are operated by a 1⅜-in. steel cable through a double drum Wellman-Seavor-Morgan electric hoist driven by a 300 horsepower a. c. slip-ring motor.

The car at the top is loaded by opening a Link-Belt rocker gate which permits the crushed rock to fall from the bin into the car by gravity. The car at the bottom is automatically dumped by a trip which opens out the sides allowing the load to fall into the loading bunkers.

A stiff leg derrick having an 80 foot boom and a 20 ton lift is located beside the crusher house. This is so arranged that the crushers can be set in place or dismantled for repairs with this crane. It can also be used for unloading any machinery or supplies that are sent up in the incline cars.

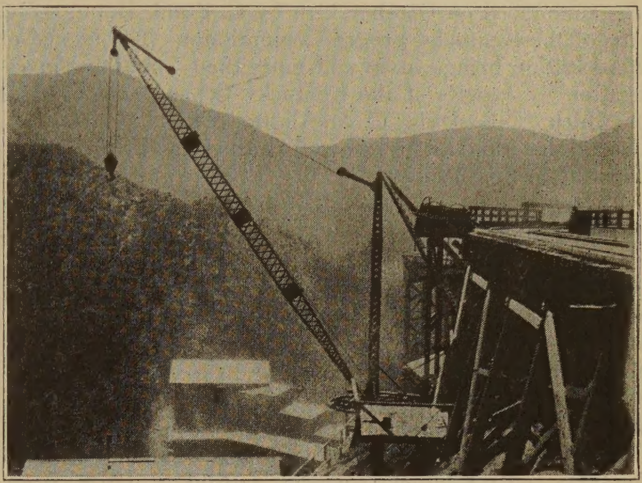
The incline railway has a total rise of 900 feet and a length of 2000 feet and the cars are operated at a speed of 500 feet per minute. The grade down from the crusher house for the first 1200 feet is 72 per cent and the remainder of the way, 10 per cent. The track is carried across the canyon on a 300 foot trestle.

The present output of the quarry is about 600 tons per day which will be increased to 800 tons or more in the near future as the demand increases. The quarry will have a floor about half a mile long when fully developed.



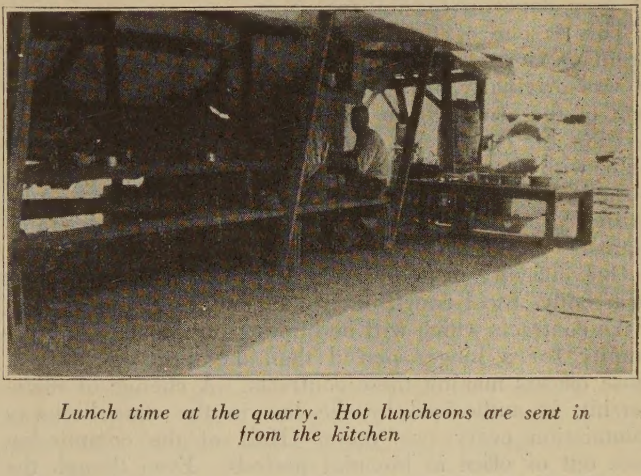
Incline railway and loading bunkers over the railroad track

About 35 men are employed in the quarry operation including those in the offices and in the quarry proper. Bunk houses are provided for those who wish to live at the plant. Meals are served in a spacious well lighted dining room. The culinary department is very complete and efficient. All cooking is done on electric ranges and an abundance of electrically heated water is furnished for all purposes. The buildings are heated in winter by electricity. A 7-ton Yorke ice machine in the basement furnishes ample cold storage and sufficient ice for all purposes.



Boom derrick at the crusher house with 80-ft. boom for unloading material and dismantling crushers

A hot lunch is sent up to the compressor house each day at noon so that those working on top are furnished with practically the same meal as is provided in the dining room. Pure snow water is piped from a mountain stream back of the quarry, for all domestic purposes. Electric power is obtained from a high tension line of the San Joaquin Light and Power Company which passes over the quarry.



Lunch time at the quarry. Hot luncheons are sent in from the kitchen

(A later article will describe the interesting features of the plant itself.)

Another California Plant

An option held by undivulged eastern interests on a location for a cement plant at Lomita, near San Pedro, Calif., is likely to be exercised shortly if boring tests now under way prove as satisfactory as anticipated.

Select Location of Kentucky Plant

Vicinity of Frankfort, Having Water and Rail Facilities, Choice of Kentucky Cement Corporation

On a site near Frankfort, Kentucky, will be located the $2,500,000 cement plant for which more than 50 Kentucky cities and communities in the state have been bidding, it was announced on October 11th by C. Frank Dunn, secretary of the Kentucky progress commission. The choice of this location brings to an end more than 7 months' investigation by experts of the Kentucky Cement Corporation, of which F. B. Drew of McAlester, Okla., is president. Central location as to rail and market facilities was influential in this decision.

The corporation has exercised options turned over to it by the Frankfort chamber of commerce and actual construction work will begin by or before December 1st. The Hunt Engineering Company of Kansas City, Mo., has been retained by the company to do the engineering work, and officers are in the East to negotiate for the purchase of machinery equipment.

The plant's annual output is placed at 1,400,000 bbls. of special cement manufactured by the "semi-dry" process. Under terms of the contract with the commonwealth of Kentucky, only Kentucky material and labor may be used.

The $2,500,000 in stock issued has been fully subscribed. Main offices of the company will be established at Frankfort, with branches scattered over the state.

An interesting comment on this new cement plant—not caused by "sour grapes" because of the choice of location—is found in the editorial from the Owensboro, Ky., Messenger, reproduced below:

A State Fostered Plant

The proposed cement plant to be located at Frankfort to furnish the material for building Kentucky roads is of very doubtful feasibility.

This is one of the schemes emanated from the busy brain of Governor Sampson and some of his associates. It was originally said this plant would be given 75 per cent of the orders to be made by the state highway commission for cement for road and bridge building in this state, with the provision that this cement should be furnished at a discount of about 10 per cent from the prevailing price for cement offered from privately operated plants.

One difficulty is that no highway commission or other such body, fiscal court, or city council in Kentucky, can make contracts which will be binding on the state or community for a longer period than the term of office of those officers making these contracts. A change of membership is authorized by the law in the state highway commission every two years. Half of the commission goes out of office in biennial periods. Even though the same commissioners should be reappointed the new commission, when reorganized, is not obligated to take over the contracts of its predecessors, and no commission can appropriate funds to cover a period longer than its term of service.

It may also develop that great manufacturers of cement throughout the country will see to it that this state-fostered cement plant will not have easy sailing in fixing the price for such a great quantity of cement as will be used in highway and bridge building in Kentucky.

The originators of this cement plant may come to grief and possibly involve the state of Kentucky in grief before they get very far with their undertaking.

The following is an excerpt from the news item announcing the proposed location of the cement plant, as found in the the Irvine, Ky., "Herald," under date of October 12th:

Just how the highway commission will control the sales of cement is not divulged, but it is said to have contracted for 75 per cent of the output of the plant, which will be 1,400,000 barrels per year. Contractors doing road work are supposed to buy the cement in the open market at the best prices obtainable. It is hardly likely that they would accept a contract compelling them to buy cement from the highway commission, and it is not yet decided that the commission has the power under the act creating it to enter into the wholesale distribution of road supplies.

An editorial in the same issue says in part:

"The state fostered" cement plant has been located at Frankfort. It has been the observation of the Herald that when an attempt was made to mix business and politics it was business that suffered. This has no reference to partisan politics. Experience has proven that no politically appointed board can function in a satisfactory way.

Pacific Coast Regional Safety Meeting One of Best

About 150 persons attended the Pacific Coast regional safety meeting at the Palace Hotel, San Francisco, Calif., on October 2nd, and contributed to make it one of the most successful regional safety meetings in the history of the Portland Cement Association's sponsorship of these gatherings.

A committee, presided over by W. H. George, secretary and general manager of the Cowell Portland Cement Company, conducted the meeting. Mr. George presided at the morning session. At this time a talk entitled "Recent Progress of Safety Work in the Cement Industry" was given by A. J. R. Curtis, of the Portland Cement Association, followed by "Some Wav to Avoid Electrical Hazards in Cement Mill Practice," by W. J. Johnson of the Westinghouse Electric and Manufacturing Co. Other talks were delivered by L. G. Gianini of the General Electric Co., on "Better Lighting as a Means of Greater Safety," and by H. D. Gaskill, of the Hercules Powder Co., on "Avoiding Blasting Powder Hazards."

J. H. Colton, vice-president of the Pacific Portland Cement Company, presided at the afternoon session. The early part of this session was occupied by a round table discussion of outstanding safety problems of the hour. The discussion was followed by a first aid competition, in which the following teams took part: Cowell, Pacific, of Redwood and of San Juan Bautista, Yosemite, and Santa Cruz and Superior. They are arranged in the order in which they were awarded prizes, the Cowell team taking first prize. The winning of first place included a prize of $20 to each member of the team and the first aid medals of the National Safety Council and the American Red Cross.

Penn-Dixie Income

The Pennsylvania-Dixie Cement Corporation reports for the first eight months of the year a net income of $808,018 after depreciation, depletion, interest and federal taxes. This is $190,000 in excess of preferred dividend requirements for the period.

Peerless Plant Value Cut

The Peerless Portland Cement Company, in a conference with the Michigan state tax commission, was successful in having the tax value of its Union City plant property reduced from $270,000 to $175,000.

Classifying Materials by Air Separation

Principle—Application—Theory—Practical Considerations—Historical Review—Classification—Devices with Horizontal and Vertical Current—Centrifugal Types—Regulation

By E. C. BLANC

> ***Note by the author:* Literature on the subject of air separation is very scarce. The author, who has studied the problem for several years, has not as yet reached a complete and coherent solution. Nevertheless, he has consented to publish this article, though he is perhaps best aware of the vague, incomplete and possibly inexact character of some of its parts. He will welcome objections, criticisms and corrections by readers interested in this problem, expressed through the medium of this publication, and wishes at this time to state his appreciation of any such efforts to advance the knowledge of this little known branch of technology of materials.**
>
> **E. C. B.**

CLASSIFYING materials by means of an air current may be considered from two standpoints: Separation of homogeneous materials into groups corresponding to sizes of particles or separation of heterogeneous materials according to the density of their constituents.

Separation according to density is practiced in a crude way in agriculture in cleaning the grain. It also finds application in the concentration of minerals, yet separation by water carries the preference here as it yields more accurate results.

Volumetric separation may be equally effected by hydraulic means. This process is thus used in the preparation of certain minerals. Yet air separation is gaining more and more ground and we will confine ourselves to this method in the present article.

Air separation is used in classifying dry materials in a granular or pulverized state.

It is competing with mechanical separation by means of screens and sieves. Theoretically it may be said that the use of air separation begins where sieves are no longer economical, i. e., when the sieves, if used, must be so fine that they become too sensitive, are apt to get clogged and have a low yield.

Sieving operations cease to be good industrial practice when the required openings are smaller than those of a sieve with 80 meshes per lin. in. (No. 80 sieve), which means a size of particle of about 0.2 mm.

Air separation can be used up to size 0.5 mm. corresponding to the No. 30 sieve. We may thus distinguish three cases:

Sizes above 0.5 mm. (No. 30 sieve)—classifying proceeds with screens and sieves.

Sizes 0.5 to 0.2 mm. (sieves No. 30 to No. 80)—in accordance with the needs of any particular case classifying may proceed by means of sieves or by air separation.

Sizes below 0.2 mm. (No. 80 sieve)—air separation is the only method which remains practical on an industrial scale. Air separation will thus find application in all handling of dry powdered materials, particularly such manufactured daily in large tonnages, as cements, limes, gypsum, pulverized coal, dyes, fertilizers, etc.

Theoretical Study

Although, as we will see later, the first application of air separation goes back about half a century, few theoretical studies have been published on this subject.

The first serious attempts to study the laws of the fall of solid particles in a current of air were made by a French scientist, Thoulet, whose remarkable work has unfortunately remained but little known.

In studying the separation of minerals, Thoulet measured the size of particles of quartz (d.:2.6) carried away by air currents of known velocity in a glass tube of 4.15 mm. inside diameter and 650 mm. long placed in a vertical position.

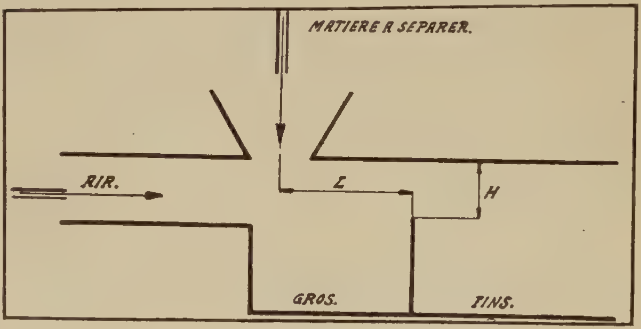


Figure 1

The results of 4 tests are tabulated below:

Ref. No.	Velocity of air, m. per sec.	Average diam. of part. reduced to spheres per mm.
1	1.51	0.141
2	2.25	0.267
3	2.67	0.2918
4	5.40	0.3766

By interpolating between the above values and applying these to particles of varying density in accordance with mathematical rules, the following table is established:

Translated from *Rev. des Materiaux de Constr. et de Trav. Publics.*

TABLE I

Radius in mm. of particles carried away by air current of given vel. (by Thoulet)

Velocity, m. per sec.	Weight, mg.	Density 1	1.5	2	2.6	3	4	5	6	7	8	9
1.70	0.01	0.1336	0.1167	0.1061	0.0972	0.0927	0.0842	0.0784	0.0735	0.0698	0.0668	0.0642
2.05	0.02	0.1684	0.1471	0.1337	0.1225	0.1168	0.1061	0.0985	0.0927	0.0880	0.0842	0.0808
2.50	0.03	0.1928	0.1684	0.1530	0.1402	0.1337	0.1214	0.1127	0.1061	0.1008	0.0964	0.0927
3.00	0.04	0.2122	0.1853	0.1684	0.1543	0.1471	0.1336	0.1241	0.1168	0.1109	0.1061	0.1020
3.60	0.05	0.2286	0.1996	0.1814	0.1662	0.1585	0.1440	0.1336	0.1258	0.1195	0.1143	0.1099
4.30	0.06	0.2429	0.2121	0.1928	0.1766	0.1684	0.1530	0.1420	0.1337	0.1269	0.1214	0.1168
5.15	0.07	0.2557	0.2233	0.2029	0.1859	0.1773	0.1611	0.1495	0.1407	0.1336	0.1278	0.1229
6.10	0.08	0.2673	0.2335	0.2122	0.1944	0.1853	0.1684	0.1563	0.1471	0.1397	0.1337	0.1285
7.15	0.09	0.2780	0.2429	0.2207	0.2022	0.1928	0.1751	0.1626	0.1530	0.1453	0.1390	0.1336
8.50	0.10	0.2880	0.2515	0.2285	0.2094	0.1997	0.1814	0.1684	0.1585	0.1405	0.1440	0.1384

Other authors have studied the movement of minute solid particles constituting smoke and dust. W. E. Gibbs (*Aerosols in Industry*, Brit. Soc. of Chem. Ind., 1925) indicates the following:

Diam of particle, mm.	Rate of drop, cm. per sec.
0.1	30.
0.01	0.3
0.001	0.003
0.0001	0.0003

As will be easily seen, these velocities are practically nil and precipitation can only be effected by chemical or electrical means. Therefore, particles less than 0.01 mm. in diameter do not yield themselves to air separation.

British Research on Cement

Considerable experimental study on air separation was made by Dr. Geoffrey Martim of London in his research work on the theory of grinding made for the British Portland Cement Research Association. Below is given a tabulation of results recently published (British Ceramic Soc., vol. XXVI, 1927) and, to the author's knowledge, not yet reproduced in France. These studies deal with the laws governing the grading of powdered materials as well as with their separation by means of an air current.

The tests were made with a ground quartz sand in a special, very precise apparatus. which permitted measurement and regulation of velocities, temperatures, hydrometric state of air currents at all times.

Classifying proceeded in vertical tubes 50 to 150 mm. in diameter and 1.50 to 1.80 m. high. The air velocities varied from 0.05 to 6 m. per sec. The products obtained were carefully handled and measured by means of a microscope. The following rules were deduced from a large number of tests:

1. In a sample of the pulverized product the number of particles N has the following relation to their corresponding size X:

$$y = \frac{\delta N}{\delta X} = a \, . \, e^{-bx}$$

referred to by analogy as the law of compounded interest. If W is the weight of a homogeneous group separated by air, X the average arithmetic diameter of particles composing this group, then

$$f_x \frac{\log_e W}{X^3} = \text{a straight line.}$$

2. The ground sand, subjected to progressive air currents, may be separated into groups defined as homogeneous, which will show no variation in the average diameter of particles with subsequently resumed air separation. Thus the curve having the number of particles as ordinates and the corresponding diameters as abscissae remain constant. This curve has the equation:

$$N = a \, . \, e^{-bx2}$$

referred to, by analogy, as the law of probability.

The process of successive air separation is, in fact, analogous in its results to the process of fractional distillation of liquids. By means of suitable distillation a complex liquid may be resolved into fractions with constant boiling point in which no change is produced by further distillation. Similarly, air separation of dusts yields "fractions" which "distil" in a current of air corresponding to certain conditions. In repeating these operations we cannot change the nature of these fractions nor resolve them into simpler components.

These homogeneous groups of particles may be considered as the elements constituting the complex mixes leaving the mill.

3. The velocity of the air current required to carry particles of a given diameter "d" is expressed by the formula below:

(a) When the particle is of a very small diameter, V is proportional to the square of the diameter:

$$V = kd^2 \tag{1}$$

This was already known as the Stokes law.

(b) As d increases, Stokes' law is replaced by a linear function:

$$V = k(d - d_0) \tag{2}$$

(c) As d increases further, the linear relation is in turn replaced by a parabolic function:

$$V = k\sqrt{d} \tag{3}$$

The relation becomes unstable as, for each given air velocity, another law imparts to the particles a greater rising power. The causes of this transition are not yet known.

Critical Values

In accordance with Dr. Martim's experiments, Stokes' law (1) holds for diameters of 0.01 to 0.07 mm., the linear relation (2) for 0.07 to 2 mm. and the parabolic relation (3) for diameters greater than 2 mm.

Co-efficients

Stokes law may be written as follows:

$$V = 0.605\,k(1 - h)\,g\,\frac{(\delta - \delta_0)}{u}\,r^2 \tag{4}$$

where: V is in cm. per sec.;
k and h—constants;
δ density of particle;
δ_0 density of the fluid;
g acceleration of gravity, 981 cm. per sec.;
u co-efficient of viscosity;
r average diameter of particle in cm. $d = 2r$.

For air at 15 deg. C. and quartz sand, the numerical values are:
$k = 0.335$; $h = 0.28$; $\delta = 2.65$; $\delta_0 = 1.221 . 10^{-3}$; $u = 181 . 10^{-3}$.

Thus: $V = 524\,700\, d^2$.

The linear relation would have the exact formula:

$$V = k\frac{(\delta - \delta_0)^{2/3}}{\delta_0}\; {}^{2/3}g \;\frac{(r - hr')}{y^{1/3}} \qquad (5)$$

where V, k, h, δ, δ_0, g, r have the values as above;
y is the co-efficient of kinematic viscosity $= u . \delta_0$.

$$r' \text{ (the critical radius)} = \sqrt[3]{\frac{9u^2}{2g\delta_0(\delta - \delta_0)}}$$

For air temperature of 15 deg. C. and quartz sand:
$y = 0.1483$ c.g.s. and $r' = 3.59 . 10^{-3}$ cm.

It follows:

$$V = \frac{d - 2 . 10^{-3}}{0.19105 . 10^{-3}} = 5234(d - 2 . 10^{-3})$$

Formula (4) may be derived from formula (5) by making $r = r'$.

For high velocities:

$$V = k\frac{(\delta - \delta_0)^{1/2} d^{1/2}}{\delta_0}.$$

For air temperature of 15 deg. C. the numerical value is:
$V = 2371\sqrt{d}$.

The application of this formula, however, lies beyond the domain of air separation.

Thus bodies capable of being classified by air separators obey either Stokes' law (particles finer than the No. 200 sieve) or the linear law (particles ranging from sieve No. 200 to sieve No. 10).

The table below was computed by means of the preceding formulas:

TABLE II

Stokes law			Linear law		
Vel. cm./sec.	d mm.	Sieve No.	Vel. cm./sec.	d mm.	Sieve No.
0.5	0.0098	—	30	0.073	200
1	0.0138	—	35	0.0866	180
2	0.0195	—	40.54	0.0975	170
5	0.0309	—	58.82	0.1324	120
10	0.0437	325	71.78	0.1571	100
15	0.0535	250	87.48	0.1872	80
20	0.0618	230	105.45	0.2215	—
25	0.0691	220	121	0.2512	60
—	—	—	137.9	0.2835	50
—	—	—	241.8	0.482	35
—	—	—	323.5	0.638	—
—	—	—	419	0.820	—
—	—	—	500	0.970	20

Effect of Temperature

The size of particle carried away by a current of given velocity increases very clearly with temperature. Table III shows the variation of the co-efficients u and r' as well as the specific gravity of air at different temperatures.

It will be noted that the results of measurements made by Dr. Martim and re-established by means of formulas, differ considerably from those obtained by Thoulet (Table I). This large discrepancy can be explained only by the different conditions of test in the two cases: Thoulet carried out his experiments in a narrow tube (4.15 mm.) while Dr. Martim operated with tubes 50 to 150 mm. in diameter, which more nearly reproduced practical conditions without, however, closely approaching these, for the diameters used in in industries vary from 1 to 4 m.

TABLE III

Temperature, C.	u	δ_0	r'
15	$181 . 10^{-5}$	$12.21 . 10^{-4}$	$3.6 . 10^{-3}$
100	224	9.47	4.5
300	299	5.95	6.3
340	304	5.76	6.5
427	338	5.14	7.3
482	352	4.68	7.7
500	360	4.57	7.8
538	372	4.36	8.2
815	446	3.25	10.2
926	472	2.94	10.9
1093	509	2.59	12.0
1427	579	2.08	14.1

The investigations described above do not cover that part of the problem dealing with the effect of the diameter on separation. On the other hand, the author does not know of any other investigator who has tried to determine the carrying power of the air at different temperature and pressure conditions.

A given volume of air cannot carry away an unlimited quantity of dust. The saturation limit is quickly reached, at least at low pressures.

It is obvious that the performance of air separators is sharply limited by the saturation limit, which makes this point worthy of investigation. The following figures are given for compressed air handling of pulverized coal:

333 gm. of coal per cubic meter of free air, at a water pressure of 300 to 400 mm., the displacement velocity being 25 m. per sec. (Holbeck system).

12,500 gm. coal per cubic meter of free air with a pressure of 2 to 3 kg. (Quigley system).

Up to 62,500 gm. per cubic meter with a Fuller-Kinyon pump (the velocity of the mixture being 28 to 35 m. per sec.)

It would seem that in air separators, where the pressure is equal to only a few centimeters of water, 300 gm. per cubic meter must represent a saturation limit difficult to exceed (densities of materials 2.5 to 3).

On the other hand, in most air separators the air travels in a closed circuit. Two periods are noted in the circuit: (1) that of separation; (2) that of depositing the dusts. Complete purification of the air is impossible in a device of this kind.

We have seen above that the finest particles have a rate of drop which is practically nil. They would thus remain in constant circulation until the air would become saturated with particles of this size. Flocculent deposits of these colloidal dusts would thus be formed. What is their influence on the principal phase of separation? This remains to be established. The charges of static electricity produced by the friction of certain materials also have an important influence on separation. It is also not to be denied, though no law has as yet been established in this connection, that the shape of particle is of importance.

The foregoing shows how difficult it is to establish a theory of air separation or how much such a theory still lacks in experimental foundations.

However, in spite of this lack, considerable results have been obtained for some time. These are to be described below.

Types of Air Separators

There exist four principal types of air separators:

1. Separators interrupting the free drop of particles by a horizontal air current;
2. Separators interrupting the free drop of particles by an upward vertical current;

3. Separators in which the material is subjected to the action of centrifugal forces in stationary air;
4. Separators in which the particles moving with the horizontal centrifugal force meet an upward air current [combination of (b) and (c)].

Separators with Horizontal Current

This type is illustrated in Fig. 1.

The air current of constant velocity V is admitted on the left. The material to be separated drops through the funnel above *without initial velocity*.

If H is the vertical distance between the point of admission and the top of the separation chamber, we can compute the horizontal distance L to be such that for a given velocity V a certain size of particles will be deposited in the first chamber.

Example: V = 500 cm. per sec.
H = 50 cm.

It is desired to separate all particles coarser than 0.5 mm. (No. 30 sieve).

Table II shows that the rate of drop of such particles is 250 cm. per second. A descent of 50 cm. in moving air will thus consume one-fifth of a second, during which time the horizontal distance covered will be:

$$\frac{V \cdot 1}{5} = 100 \text{ cm.}$$

A chamber situated at 1 m. from the place of drop and 0.50 m. below will, therefore, retain all particles coarser than 0.5 mm. Theoretically (that is, without taking into account the eddies and friction along the walls) it is possible to thus classify successively particles of 0.2, 0.1, 0.05, etc., mm. in diameter.

Various devices were based on this principle, yet few of them have subsisted to this day.

Among these was the F. Triollet separator (French patent of Nov. 3, 1885) which was used to some extent in lime plants. The air current produced by a fan was admitted into a revolving drum, in which the material was being mixed. Upon leaving the drum the dust became precipitated in a large settling chamber.

The Branget separator patented in 1902 made use of the same principle, but had a fixed tank in which the material was agitated by paddles. The fan and the settling chamber were housed together with the separator. This device naturally did not permit the occurrence of large hard lumps in the material on account of the sensitive agitators.

It was built in five sizes as described below:

TABLE IV

Branget Separators

Ref. No.	00	0	1	3	3
Length, m.	1.0	1.8	2.7	3.3	3.8
Width, m.	0.9	1.2	1.7	1.0	2.2
Height, m.	1.2	1.3	2	2.35	2.7
Weight, kg.	350	900	1,800	2,200	2,700
Power, h.p.	0.25	1	1.5	2	3
Hourly output, kg.	300	250	1,000	2,000	3,000

The A. Sorcel separator (Fig. 2) represented a combination of the two preceding devices and was less subject to wear than the Branget separator. The material fed into it could contain coarser lumps.

These devices have been almost exclusively used in the lime industry. Their production is not high enough considering their size. Yet they accomplish a separation which is nearly perfect as only 2 to 5 per cent of the sizes to which the separator is adjusted are found in the waste (coarser material). In centrifugal devices this percentage easily reaches 10 and 15 per cent. This is due to the fact that in the Branget and Sorcel separators the material is agitated in contact with air for several minutes, while in the centrifugal devices the contact is established only for a few seconds.

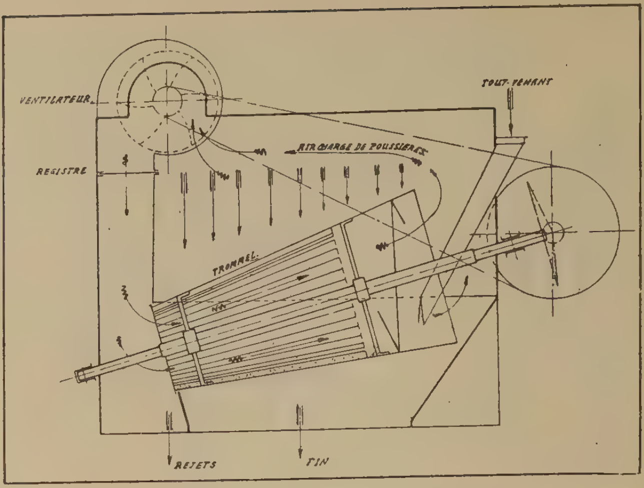


Figure 2

The Kennedy tube mills are an example of air separation making use of a horizontal air current. However, this article deals only with separators proper and refers any reader who may be interested in the combination features of such devices to special literature (E. C. Blanc, *Technology of Crushing, Grinding and Classifying,* 1 vol., Librairie Beranger, Paris, 1924 and *Le Ciment Portland* (Raw materials. Manufacture of materials, plant layouts) 1 vol. Librairie Beranger, Paris, 1927).

Separators with Upward Current

These separators are of a type illustrated in Fig. 3. The air current of constant or variable velocity V is directed from below. The material is introduced without appreciable initial velocity. Particles whose rate of drop in air is greater than velocity V fall more or less rapidly on the bottom of the hopper. Those whose rate of drop is lower are carried away over the edge.

The difficulty consists in providing a sufficiently close and prolonged contact of the material with the air current.

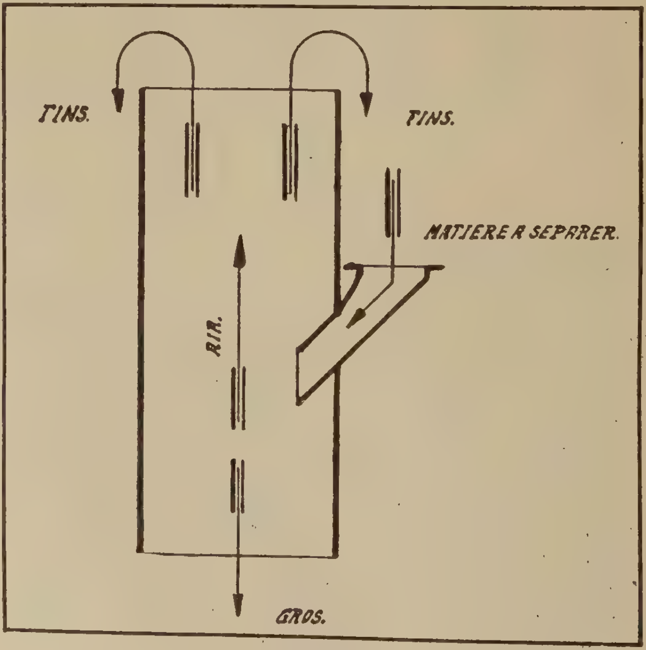


Figure 3

Based on this principle are:

The Krom air separator with intermittent air pulsations, used in the past for classifying materials, but abandoned since.

The Raymond separator shown in Fig. 4 which is used extensively in separating very fine materials (limes, talc, dyes, etc.).

The material to be separated is introduced at the bottom of the separator by a distributing drum. It meets the air at this point and the fines are carried away by the current while the coarse material falls directly into a pipe below.

The air loaded with dust enters a separation chamber built as a double cone where the velocity is reduced and the current reversed. All particles greater than a certain size are thus deposited in the central cone, while the fines are carried away by the current towards the fan. Upon passing through the fan, the mixture of air and dust is led to a cyclone (centrifugal collector) where reduction of velocity and friction along the walls (centrifugal effect) cause the dust to separate from the air.

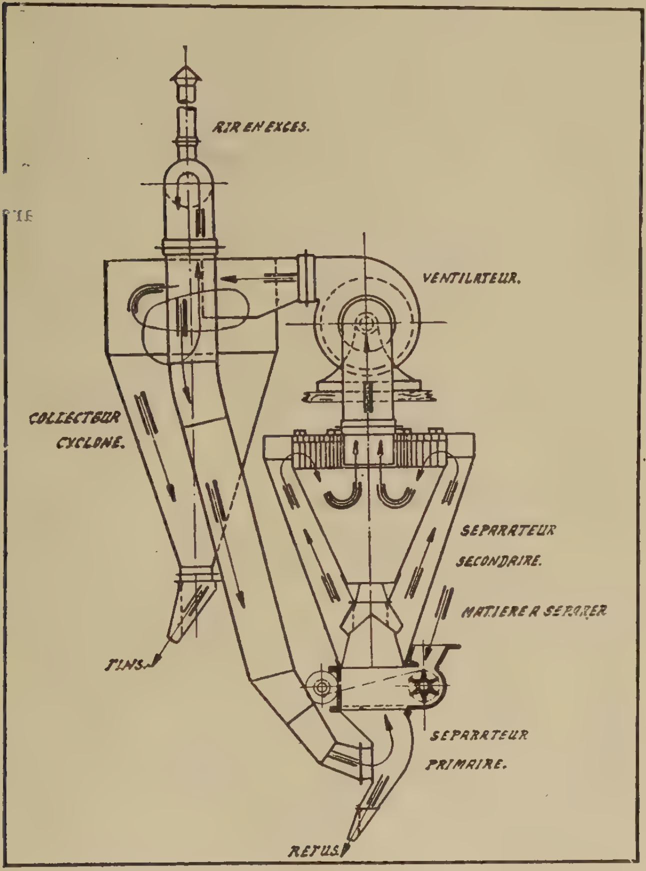


Figure 4

The purified air returns to the lower part of the separator while the product is collected at the bottom of the cyclone. The fineness of the product is regulated by means of inclined paddles of variable angle placed within the inside cone and by the lid of the apparatus. Yet the principal control is exercised by varying the velocity of the air or the surface of the blades of the fan.

Separation thus takes place inside the double cone. The coarse particles settle at the bottom and are removed as soon as a sufficient weight is accumulated to open the automatic valves. A vacuum of several centimeters of water is maintained in the separation chamber. This rarefication of air influences the selection of particles.

For some time machine designers have worked on a device which would permit the feeding to be regulated automatically in accordance with the vacuum inside the apparatus. This would insure perfect regularity of the finished product.

The Raymond separator is used mainly in conjunction with mills and centrifugal pulverizers of the same name. In this case the primary separation chamber is replaced by the mill itself and the product is not discharged until it has reached the desired fineness.

Bonnot, Fuller and other pulverizers have similar arrangements.

(To be continued)

Bureau Wars on Foreign Cement in Philadelphia

Changes in city paving specifications are to be made by Philadelphia, Pa., following a hearing at which cement manufacturers claimed that they have been excluded from bidding on work, and that a British manufacturer has been favored.

At the hearing, held October 22nd, the Cement Information Bureau at Philadelphia, represented by Morris Wolf, charged that the British product used by the city does not meet the present specifications, and that they are so drawn that American cement cannot meet them. The director of public works of Philadelphia in turn denied the allegations that the British cement had been shown preference, but that its use was brought about by the city's desire to obtain the best product for the money and a material that would harden quickly.

The hearing was based upon action of the deputy city controller in withholding payment to the paving company.

It is claimed also that American manufacturers were barred from bidding by the requirement of the bureau of highways that the cement must have a tensile strength of 300 lbs. in 24 hours and 450 lbs. in seven days. Tests made of the British cement are said to have shown only one-half of the required strength.

The refusal of Mayor Mackey of Philadelphia to support a recent resolution passed by the City Council in behalf of American manufacturers was recalled when Mr. Wolf's to the city letter was made public. In June, 1928, a member of the City Council introduced a resolution which was unanimously passed, providing that only American products should be used in city work. In refusing to approve this measure, the mayor claimed that to ban all foreign materials in the city contracts would work a great injury on the Port of Philadelphia.

Ideal Cement Company Taps Another Gas Well

On September 22nd the Ideal Cement Company was credited with having brought in its third gas well on its Ada, Okla., property, the latest well flowing 4,000,000 cu. ft. of gas daily. The three wells are good for 25 million cubic feet of gas daily, but two of the wells have been shut in for reserve. Its first well, an oil producer, is making about 100 bbls. of oil daily and this is being sold to an oil company.

Tampa Plant Reopens After Two-Month Shutdown

The plant of the Florida Portland Cement Company at Tampa again began operations on October 1st, after being closed down for two months. The plant was shut down on August 1st because of slack demand for cement and more than sufficient storage.

Entire British Cement Industry Unites Into One Group

There is peace at last in the British cement world. For some time past the industry has been divided into two factions, the federated companies and the non-federated. Leading the federated companies within the Cement Makers' Federation are the two important concerns, Associated Portland Cement Manufacturers, Ltd., and British Portland Cement Manufacturers, Ltd., of which P. M. Stewart is chairman. These two companies alone represent an investment of over £13,000,000 ($65,000,000). The principal figures in the non-federated section are the companies linked up in the "Red Triangle" group, better known in financial circles as the Horne group. The competition between the federated "Blue Circle" group and the non-federated "Red Triangle" group has been keen, almost developing into a price-cutting war.

For many months past quiet efforts have been made to bring the two sections to an understanding. Informal discussions have taken place, and finally these negotiations reached such a stage that the companies in the "Red Triangle" group formally expressed their willingness to join the Cement Producers' Association on satisfactory terms being arranged. A conference was subsequently held at which general agreement was reached. Today, therefore, it may be said that the British cement industry has but one form of competition to meet—that from the overseas producer. In this connection it may be pointed out that British cement imports have shown a distinct tendency to fall this year, the total in the eight months to the end of August being 204,410 tons, in comparison with 296,140 in the same period last year, while the price this year averaged only £1 8s. per ton against £2 2s. ($7.00 against $10.50) imported last year.

Meanwhile, another striking financial rearrangement is announced in connection with the "Red Triangle" group. Recently stockholders in the Dunstable Portland Cement Co., Ltd., received an offer of £2 ($10.00) per share for their holdings from the Anglo-Atlantic Corporation and Cement Products & Finance Co., the "Red Triangle" finance companies. This offer was accepted, the deal involving £1,250,000 ($6,250,000).

Now it is announced that a controlling interest in the Dunstable Company has been sold to the Holborough Cement Co., and that in order to finance the sale that "Red Triangle" company is increasing its capital from £500,000 to £1,500,000 ($2,500,000 to $7,500,000).

One of the chief aims of the British Cement Makers' Federation is to have a co-ordination scheme for selling prices of cement and for mutual assistance generally among members. The membership of the "Red Triangle" group will make this possible.

Fewer Accidents in Stone Quarry Industry in 1927

Marked progress was made by the stone-quarrying industry in the United States in the reduction of fatal accidents among its employees in 1927, according to reports furnished by operating companies to the United States Bureau of Mines, Department of Commerce. The death rate from accidents was lower than ever before, with the single exception of the year 1924, in which year the death rate was the same as that for 1927. The non-fatal injury rate, covering all lost-time injuries, was slightly higher than in the preceding year but it was lower than in any other year since 1920. The number of men employed at the quarries and the number of shifts worked by them were substantially the same as in 1926. The average employee worked the same number of days in 1927 as in the year before.

Reports from the operators showed 91,517 men employed in the calendar year 1927, who worked 24,782,561 man-days, an average of 271 work days per man. One hundred and thirty-five deaths and 13,459 injuries from accidents were reported. As compared with 1926 these figures showed an increase of 371 employees, 74,161 shifts and 258 injuries. There was a decrease of 19 in the number of fatalities. Accidents during the year represented a death rate of 1.63 and an injury rate of 162.92 per thousand 300-day workers as compared with a death rate of 1.87 and an injury rate of 160.28 in 1926.

Operations inside the quarry pits employed 49,549 men who worked 12,426,312 days, an average of 251 days per man. Accidents to these employees killed 99 men and injured 8,015, resulting in a fatality rate of 2.39 and an injury rate of 193.50. In the year 1926 the reports show 50,620 men, employed inside the quarry, who worked 12,812,387 shifts, an average of 253 days per man. There were 110 deaths and 8,006 injuries in 1926 with corresponding rates per thousand 300-day workers of 2.58 and 187.46, respectively. All of the figures indicate a decrease for the year 1927 with the exception of the number injured and its corresponding rate.

"Outside" the quarries at crushers, mills, rock-dressing plants, etc., the employees numbered 41,968, an increase of 1,442; 12,356,249 man-days, an increase of 460,236. The average work days per man was 294 for both 1927 and 1926. While the fatalities decreased from 44 in 1926 to 36 in 1927, with the fatality rates decreasing from 1.11 to 0.87, the non-fatal injuries increased from 5,195 (with a rate per thousand employed of 131.01) to 5,444 and a rate of 132.17.

Quarries are classified by the Bureau of Mines according to the kind of rock produced, as follows: Cement rock, granite, limestone, marble, sandstone and bluestone, slate, and trap rock. The cement-rock quarries showed a slight increase in the number of men employed, as did granite, limestone, marble, and trap rock. The average days worked by the cement men were less than in 1926, and there was also a decrease in the aggregate number of shifts worked by the employees. There was a sharp decline in both the number of fatalities and injuries in the cement plants in 1927 as compared with the previous year; the reports for the other quarries showed little differences between the two years 1926 and 1927.

The principal causes of accidents inside the quarries were handling rock at the face, flying objects, falls or slides of rock or overburden, haulage, and machinery. Accidents at outside plants were due mainly to flying objects, machinery, falling objects, haulage, and hand tools.

Texas State Plant Project to Come Before 1929 Legislature

The findings of the Texas state board of control as to the advisability of projecting a state cement plant will be presented before the next legislature, which meets at Austin in January.

Estimates have been made as follows for their respective capacities: $500,000 to building and equipping a 500-barrel daily capacity plant; $850,000 for a 1,000 barrel plant, and $1,500,000 for a 2,000 barrel plant.

New Plant Going Ahead

The new cement mill being built by the Ideal Cement Company at Okay, Arkansas, is well under way. Mill construction is progressing, as is also work on the town to surround the plant.

EDITORIAL

Paths to Progress

THERE are many divergent views held by various cement manufacturers on the subject of high early strength cements and what shall be done with them. Nothing much is being done to co-ordinate these differing viewpoints and to suggest a constructive solution that will take into consideration the user and his needs—whether real or imaginary.

In the meantime the diversification in cement manufacturing goes merrily on. The user must needs scratch his head and consult the astrologers to see if the stars will give him any inkling as to whether "Speed-Up" or "Flash" is the best brand of cement to use for that rush job of his.

The stars, unfortunately, reveal very little. Yet they are his last resort, for he has no specifications to guide him when he gets out into that rugged, unexplored territory commonly referred to as "high early strength." Volunteer guides there are aplenty, ready to lead him to this or that seeming haven. They gather around him and in their most persuasive manner seek to entice him over this or that path to safety. The user must choose, so he selects the guide that appears to be most honest or he yields to the most persuasive one. In either case, he is taking a chance.

Need it be so? Are there not even a few signboards available that might be set at crucial points to guide the buyer? Even if the territory is not yet thoroughly surveyed and mapped, is that any reason why those danger points and turns that are pretty definitely known should not be marked?

Such an attempt—perhaps in the form of a new tentative specification—might do much to save a lot of aimless wandering. Even though later surveys might point out a better route with fewer sharp curves and easier grades, still there may be many benefits, both to the user and to the manufacturer, if the route as far as is known at present were marked.

In the first place, such marking would help to prevent the blazing of a lot of additional independent trails. It would keep the stream of travel pretty well on the marked path that is known to lead to a definite result.

Secondly, such an attempt will help to establish a definite objective at the other end of the path. It will help crystallize and co-ordinate the many present more or less indefinite ideas of just where the user wants to go. With one end of the path fixed as "standard cement" and the other at some agreed-on point as, for instance, "high early strength cement," some progress will have been made.

Thirdly, once these two points have been fixed, it will be unnecessary to move the "standard cement" point forward from time to time, as has been done in the past. Already the standard cement specification requirements have been pushed forward several times until they are close to the boundaries of the "high early strength" territory. If the requirements are increased again and yet again, will they not shortly approach the farther end of the path and be in effect a high early strength specification?

And will not this continual moving forward work an unnecessary hardship on the industry? As the specifications advance, the cost of manufacturing will also advance. Ultimately this will result in a higher selling price for cement and the industry will suffer in price competition with other building materials.

The present standard quality of cement may always be sufficiently high for the largest portion of the concrete placed. Is it, therefore, not the part of wisdom to prevent a further forward movement of this specification? Can this not be done most effectively by providing another additional specification beyond and above the present standard? He who cares to travel farther can do so at the extra cost of the additional distance.

But the path beyond must be marked. If it is not, the user may become hopelessly lost and the industry as a whole will suffer.

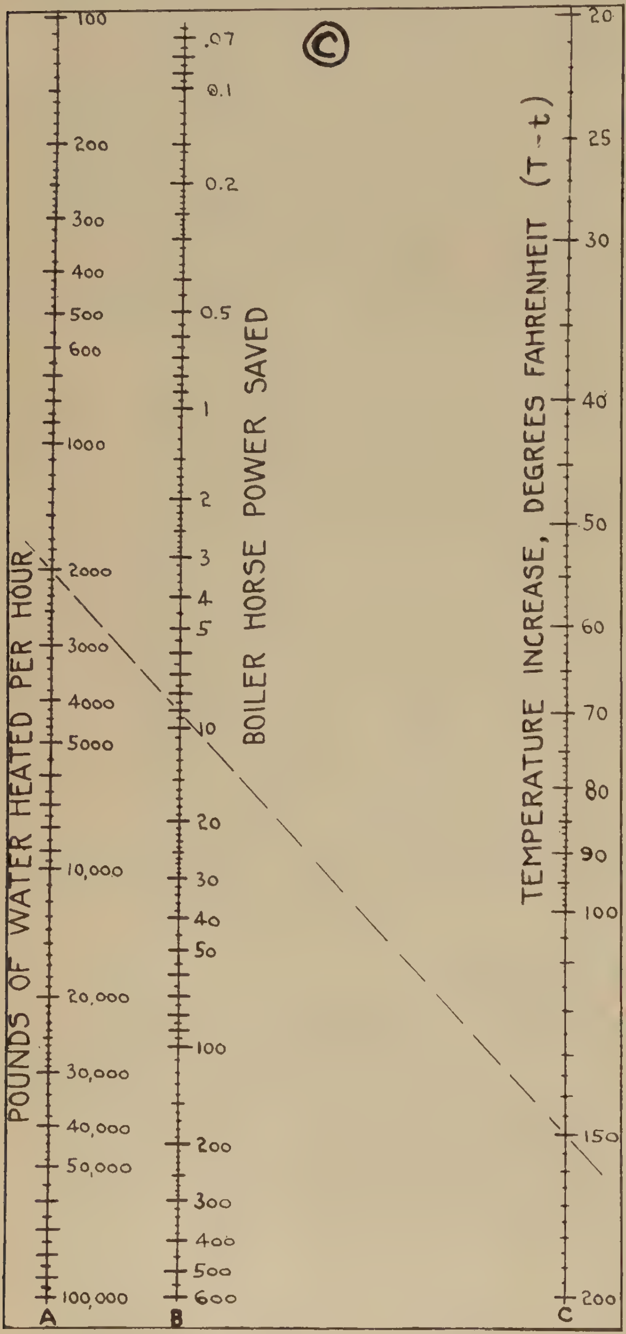
Recognition

THE election of Major Henry A. Reninger, of the Lehigh Portland Cement Co., as president of the National Safety Council at its recent meeting in New York, is eloquent testimonial of the esteem in which the Safety Council holds the accident prevention record of the cement industry. And it is fitting that a man who has been prominent in that work was selected to receive the high honor.

Boiler Horsepower Saved by a Feed Water Heater

The feed water heater is generally a device that is not properly appreciated, the idea persisting that such heaters are "made to sell" mostly, that they are a "theoretical" addition to the plant rather than a practical addition. The statement is made in advertisements, "a feed water heater will save from 10 to 25 per cent of your coal" and the reader or prospective buyer immediately adds his grain of salt.

The boiler horsepower saved by a feed water heater is found in Column B of the accompanying chart by simply laying a straight edge across the chart.



For example, if you use 2000 lbs. of water per hour and if a feed water heater will increase the temperature of the feed 150 deg. F., how many boiler h.p. will the heater save?

Connect the 2000 (Column A) with the 150 (Column C) and Column B shows the saving to be 9 boiler h.p. as indicated by the dotted lines drawn across this chart.

In other words, the feed water heater virtually gives you 9 boiler h.p. for nothing. It utilizes the steam that would otherwise go to waste. Or, if your present boiler is a 60 h.p. unit, and if you add the above heater, you can get 69 h.p. out of the boiler without burning any more coal.

In addition, this chart does not show the added saving due to keeping scale out of the boiler, which often amounts to 25 per cent in itself. Six hundred h.p. is the maximum.

British Professor Reviews Recent Advances in Cement Industry

Two outstanding features of recent progress in the cement industry were dealt with by Professor C. H. Desch, F.R.S., of Sheffield University, England, in a review which he has just made of current developments. They are the more perfect burning of the clinker and the finer grinding of the product. Over a generation ago it was suggested that one of the next improvements would be the complete fusion of the clinker and that the high temperature required for this purpose might be obtained by burning the fuel with air enriched with oxygen, or by electrical means. That step has so far not materialized, but the high temperatures obtained in modern kilns are conducive to the more complete combination of the components of the cement.

A step in this direction has been the production of rapid-hardening portland and aluminous cements. While hardening in a few hours they give strengths comparable with the best portland cement, and are of the greatest utility in road construction where a limited delay is desired.

The importance of fine grinding is now recognized more than ever before. Coarsely ground cement is effective only on the outside of the coarse grains. The inner material is practically inert, and might equally well be replaced by sand.

With these and other advances, however, Professor Desch stresses the necessity of applying scientific methods to the use of the material. The high quality of ancient Roman mortar and cement was undoubtedly due chiefly to the thorough admixture of the constituents, and today it is still necessary that the producer should educate the consumer of cement to extract from it its highest qualities.

Precipitator Structure for Pacific Coast Cement Under Way

The Sheble Construction Company of Seattle, Washington, will construct the new precipitator structure at plant of the Pacific Coast Cement Company now being built in Seattle. The firm procured the award from the Western Precipitator Company of San Francisco, who holds the general contract to put up the new building and equip it with necessary machinery.

The total contract calls for an expenditure of $120,000, the building alone to cost about $60,000 and the machinery the balance.

Plans drawn by engineers of the Pacific Coast Cement Company call for a steel frame structure with concrete walls. The building will be 30 by 60 feet in size and 60 feet high. Construction is expected to be completed in approximately 60 days.

Newaygo Site Cleared

The work of clearing land planned as the site of Newaygo Portland Cement Company's mill near Charlevoix, Michigan, was begun early in September.

Transportation Projects Will Develop French Region Rich in Bauxite and Cement

Some New Developments of Great Importance to the French Cement Industry

By THEODORE WOLFRAM

THAT part of France along the foothills of the Alps and bordering the Mediterranean sea is known principally for its magnificent scenery and its marvelous climate. It is not generally known that this region is also rich in minerals and natural resources. Lime, cement and bauxite exist throughout the entire district but these industries, due to a dearth of transportation facilities, have been but meagerly exploited.

Bauxite in Demand

The discovery and development of ciment fondu has brought an ever-increasing demand for bauxite. Bauxite deposits are plentiful and of superior quality throughout the hinterland of the French Riviera. Many of the richest deposits are not even being exploited because of their distance from transportation lines while others are only exploited on a small scale due to the same reason.

The most centrally located rail center of the bauxite region is the little town of Les Arcs which is on the main line of the Paris-Lyon-Mediterranee line from the Italian frontier to Paris. This important rail line—the only direct route from Paris to the Riviera—is scarcely able to efficiently handle the enormous passenger traffic which exists the year round and freight traffic suffers accordingly. Tourists may cover the distance between Paris and Marseilles in less than twelve hours but the minimum time established by the railroad for freight is six days. Marseilles is the classification point for all Paris or Lyon-bound freight and is one of the most congested rail centers of France. Naturally that makes Les Arcs a poor point of departure for freight headed for Paris, Lyons or any points necessitating passing through the classification yards at Marseilles.

The recent opening of the tunnel connecting Marseilles by canal by the way of the Etang de Berre and the Rhone canal has opened a waterway to Lyons and central France which offers a cheaper and not much slower means of transportation. This tunnel, which was begun in 1911, is more than 7 kilometers long, 22 meters wide and 15 meters high with water depth of 4 meters. This permits the passage of the largest types of barges and tug-boats.

Ship by Barge

Much of the bauxite destined for the cement mills of central and northern France is now hauled by motor truck to Saint-Raphael, Saint Tropez, Cassis or Toulon where it is loaded on small boats and carried to Marseilles or the Etang de Berre where it is transferred to barges and follows the canal route to its destination. This is a fairly cheap method of transportation but it is neither speedy nor efficient—particularly from Saint-Raphael or Saint-Tropez where no modern port facilities exist. At

A unit of the dock equipment at Marseilles for the handling of cement the latter ports the bauxite is transferred from trucks to the boats in small sacks or baskets carried on the shoulders of longshoremen. Cassis boasts a conveyor and, of course, Toulon is a real port.

Marseilles is the leading seaport of southern France but its docking facilities and freight-handling equipment have not kept pace with the ever-increasing amount of tonnage arriving at and departing from that port. Through the "payment in nature" clauses of the Dawes plan Marseilles is beginning a vast harbor-improvement plan which will begin immediately but will extend over a period of from twelve to fifteen years. New docks, new basins and new warehouses will be constructed and modern hoisting, loading and freight-handling equipment will be installed. Additional rail lines and bridges will facilitate the transfer of freight from the railroads to the cargo ships and vice versa. Harbor facilities will be practically tripled and Marseilles will soon rival the biggest of the French-Atlantic ports.

The harbor of Marseilles, from which practically all cement for the French colonies in Africa is shipped

This, of course, is of interest to the cement and bauxite industries as practically all cement, lime and building materials for the French African colonies are shipped from Marseilles. Of much greater interest are the projects for rail improvements in the region. For many years various projects for additional railroad facilities for this undeveloped region of France have been proposed and discussed. At last the government and the Paris-Lyon-Mediterranee have practically decided on a rail project which will do much, not only for the bauxite and cement regions, but also for the Riviera tourist traffic and general freight. There are two projects under consideration but the first will quite probably be adopted.

New Rail Transportation

The most favored project is for a double track line cutting off from the main line of the Paris-Lyon-Mediterranee at Avignon and running in a fairly direct line to Les Arcs where it again joins the main line. From Avignon to Cheval-Blanc, a distance of 36 kilometers, there already exists a double track; from Cheval-Blanc to Pertuis, 40 kilometers, it will be necessary to add an additional track to the single track line already existing. From Pertuis to Les Arcs, a distance of 95 kilometers, no line exists and a double track line will be constructed through this territory which is particularly rich in bauxite deposits of superior quality.

The second project calls for a cut-off from the main line at Avignon and passing through the towns of Salon, Aix-en-Provence, Brignolles and rejoining the main line at Luc, near Les Arcs. This second project has the advantage that it traverses a region already developed and passes through towns of much greater commercial importance than the first project. The drawbacks are that it would cost 70,000,000 francs more than the favored project and would not shorten the distance between Paris and the Riviera to as great an extent as project number one. Also project number two would aid a region already enjoying fairly good transportation facilities while project number one would open rich virgin territory.

Whichever project wins, the region will gain, for either project means a shortening of the rail distance between Paris and the Riviera from 60 to 84 kilometers according to which project is finally adopted. This means only a saving in actual running time of the fast through trains of about one hour but the elimination of the passage of through freight and passenger trains through the congested region of Marseilles will speed up traffic on the entire line and will also relieve the Marseilles classification yards of freight from the Riviera destined for points north, or vice versa.

While this rail project is of great interest to the bauxite and cement interests two other minor rail projects for the same region, which are of almost equal interest to the cement and bauxite industries, will probably be completed at approximately the same time as the major project. These new lines will link up Grenoble with Nice and Draguignan with Nice.

These two lines will be more or less in the nature of "feeders" connecting with the main Paris-Lyon-Mediterranee line. Their importance lies in the fact that they tap undeveloped territory and that they will be standard gauge. Most "feeder" lines in France are narrow or moyen (middle) gauge, which makes carload shipments practically impossible particularly if the "carload" originates on a narrow-gauge line, passes to a middle gauge and ends up on a standard gauge line, which all too frequently happens.

The new line from Nice to Digne will give the cement industry of Grenoble a fairly direct line to the Riviera and will link it up with the bauxite fields. The line Draguignan-Grasse-Nice is of lesser importance but it also passes through part of the bauxite and cement regions and is of importance in that it will relieve the main line of considerable short-haul tonnage.

Gorges des Loups, through which the rail line from Draguignan to Nice will pass

French Cement Industry Benefitted

It is difficult in a condensed article such as this to present such a medley of projects in a manner revealing their true importance and the reasons thereof. Before the late war France relied mostly on stone and brick for its building materials. At present the situation is quite reversed. In a survey of the recent building boom along the Riviera, a newspaper of Nice affirms that nine out of every ten new buildings are constructed of some form of cement.

Although the Riviera region contains plenty of cement, bauxite and lime for local demands and export, development has not kept pace with the demand. The Lafarge and Teil company controls a plant at Plan-du-Var with twelve furnaces, another at Valbonne equally large and a third at Contes-les-Pins with thirty-three furnaces and an annual capacity of 150,000 tons. This and other companies are still unable to fill the local demand so it will easily be realized that all transportation projects in the region are not only of importance to the bauxite, lime and cement industries of the district but also of great interest to those of the region of Grenoble, central and northern France.

English, American and German capital has been invested in the bauxite developments of the region and the English interests, at least, are now preparing for even greater activity. The French government, however, is opposed to foreign interests securing any further control on the bauxite deposits and no transactions involving the sale or lease of such deposits to foreign firms or individuals is legal without the approval of the government.

Formation and Solution of Calcium Hydroxide Crystals in Portland Cement

By JASPER O. DRAFFIN
Department of Theoretical and Applied Mechanics, University of Illinois

WHEN portland cement is mixed with water it sets and finally hardens, and in so doing it liberates calcium, which later crystallizes from the solution as calcium hydroxide in the form of stout prisms and hexagonal plates. This calcium apparently comes from the di- and tricalcium silicates which hydrolyze under the action of the mixing water. During some studies on the hydration of tricalcium silicate it was observed that some of the crystals of calcium hydroxide which were formed in the solution were later dissolved in the solution from which they crystallized, the temperature remaining the same as when they formed.

The method of study was to mix some finely powdered tricalcium silicate, which contained only very small amounts of magnesium, aluminum, and iron oxides, with distilled water on a glass slide, cover it with an object glass, and cement around the edges with Canada balsam. This left the tricalcium silicate in water which could not evaporate and from which the air was excluded. The progress of hydration on these slides was observed by means of a petrographic miscroscope.

About 12 hours after preparation many calcium hydroxide crystals could be observed and these reached their maximum size in 2 or 3 weeks. Many of these crystals had begun to corrode or dissolve at the end of 3 weeks, but this period was not constant; sometimes it was as early as 16 days; evidently it was related to the period of growth of the crystals. In many slides the crystals had dissolved completely in from 5 to 6 weeks, though the outlines were clearly defined after solution. Other slides showed some crystals dissolved while near them were crystals which were unaffected. The accompanying sketches show the manner in which the corrosion takes place. It generally begins on a prism face and not on a basal plane.

In searching for an explanation of the unusual action of a crystal dissolving in the solution from which it was formed, a number of possibilities were considered. One was a change to calcium carbonate. This was eliminated because the Canada balsam excluded the air and besides there was no trace of calcium carbonate on the slide. Another possibility was that of diffusion of the saturated solution from around the crystals to other parts of the slide, leaving unsaturated solution around the crystals. This was tested by preparing some slides with the tricalcium silicate concentrated at one side of the slide and other slides with the tricalcium silicate evenly distributed over the surface. No difference in action could be detected from this cause.

R. H. Bogue, research director of the Portland Cement Association Fellowship investigation, suggested that the soft soda-lime glass used in the slides and cover glasses might dissolve slightly and react with the calcium hydroxide in the solution. That would result in a gradual dissolution of the calcium hydroxide crystals and the reprecipitation of hydrated calcium silicate. It would account also for the skeleton outline of the crystals remaining after the completion of the reaction. Accordingly, some quartz object slides and fused-quartz cover glasses were obtained and experiments were carried on with these. No solution of crystals occurred with the quartz slides, though they were observed for 3 or 4 months. This indicates that the corrosion and solution of the crystals was caused by the soda-lime glass slides dissolving slightly, and it is believed that this is the correct explanation. The amount of solution of the slides is extremely small, so small that it cannot be detected with a microscope after the removal of the cover glass.

The acceptance of this explanation raised the question as to what would be the effect on calcium hydroxide crystals in concrete when they were in contact with soda-lime minerals such as the feldspars. Experiments were therefore made in which finely powdered albite, labradorite, and anorthite were mixed with the tricalcium silicate on quartz slides, each mixture on a separate slide, to determine whether the feldspar would dissolve and cause the solution of the calcium hydroxide crystals. The addition of the feldspars did not cause corrosion of the calcium hydroxide crystals. Apparently the soda-lime glass is more susceptible to the action of calcium hydroxide than the soda-lime minerals.

Experiments with the feldspars mixed with the tricalcium silicate are being continued.—*Industrial and Engineering Chemistry.*

What Organized Safety Work Has Done for the Cement Industry

(Continued from Page 94)

ciation not to include the figures of the foreign plants in the statistics, and for 1927 these have been left out.

In 1927, we had three plants in the first group, two in the second, and two domestic plants in the third group, and the average of the accidents in all of our plants was considerably below the average of 134 plants reporting to the association.

A complete study of the conditions in our plants, and organized efforts, intelligently guided and systematically enforced, is the only way in which the proper results can be obtained, and I believe the figures presented speak for themselves as evidence of the effect of organized efforts.

While I do not wish to impose on you with too many statements of our own performance, I feel that after all actual experience and observation is the best guidance for further efforts. I, therefore, feel justified in calling attention to just one thing in connection with our experience outside of the United States. Here at home we have all seen accident prevention grow from a rather insignificant activity some 15 or 20 years ago, until its present day enormous importance, and to some people it may be like watching a growing child, it is difficult to realize and to appreciate the changes and the developments that take place.

Four or five years ago, we began to implant the American method of safety prevention in our foreign plants. Many of us operators who are familiar with conditions were skeptical as to results, and very discouraged during the first few years. We were operating in countries where industry was but little developed, and the great mass of labor instead of being interested in preventing accidents were rather inclined to use any little injury as a pretext for laying off. Real efforts date back only to 1925, and it is simply astounding to note the interest that the men themselves are taking in this work today, and the figures which are given on the table show a very marked improvement, and I can further state that still better results have been had during 1928. Without organized safety work this improvement would not have been possible.

It is not for me to comment on the methods and details of our safety work. This is referred to on many occasions and is constantly being studied and considered by our committee, and its able chairman. A question that many of us no doubt feel inclined to ask is "Does this work pay dividends?" Does anything which reduces the interruptions in our operations, which cuts down the clerical work, which minimizes labor turnover, which saves medical expenses, and which builds up the morale of an entire organization have any cash value? The answer to these question is, of course, that it does. We, in the cement

ASSOCIATION GROUPING OF PLANTS ACCORDING TO ACCIDENTS AND DAYS LOST PER 100,000 MAN HOURS WITH THE LOCATION OF PLANTS OF THE INTERNATIONAL CEMENT CORPORATION

	1925 120 Plants Reporting	Per 100,000 Man Hours		1926 124 Plants Reporting	Per 100,000 Man Hours		1927 134 Plants Reporting	Per 100,000 Man Hours	
		Average No. Accidents	Average No. Days Lost		Average No. Accidents	Average No. Days Lost		Average No. Accidents	Average No. Days Lost
1st Group	Best 30 plants No. 1-30	.9	12.1	Best 31 Plants No. 1-31	.6	10.2	Best 34 Plants No. 1-34 Ten of these plants were awarded the Association trophy of which the Kansas Portland Cement Company was one.	.2	3.5
2nd Group	Plants No. 31-60	1.5	30.0	Plants No. 32-62	1.6	25.3	Plants No. 35-68	.5	11.2
3rd Group	Plants No. 61-90	2.9	51.8	Plants No. 63-93	2.2	49.9	Plants No. 69-102	1.1	36.2
4th Group	Plants No. 91-120	5.5	110.9	Plants No. 94-124	5.3	113.0	Plants No. 103-134	3.4	104.8
General Average all Association Plants		2.6	49.9		2.2	45.3		1.4	34.6

LOCATION OF INTERNATIONAL PLANTS IN ABOVE ASSOCIATION GROUPS

1925

		Association No.	No. of Accidents	No. of Days Lost
1st Group	No Plant in this Group			
2nd Group	Kansas	38	3.30	27.1
	Indiana	45	2.38	29.9
3rd Group	Cuba	63	2.85	41.8
	Dallas	77	2.31	52.1
4th Group	Alabama	91	4.26	65.3
	Houston	105	4.62	99.6
	Argentine	110	8.42	130.2
	Knickerbocker	116	8.13	183.4
	Uruguay	119	14.20	217.6
General Average of International Plants			5.61	94.1

1926

	Association No.	No. of Accidents	No. of Days Lost
Houston	14	.7	8.0
Kansas	39	1.0	21.2
Alabama	42	.7	21.9
Virginia	58½	2.8	33.3
Indiana	62	3.8	35.8
Dallas	83	.7	54.0
Knickerbocker	86	2.6	58.5
Cuba	104	4.5	81.4
Argentine	115	7.0	115.2
Uruguay	123	14.5	220.8
		3.8	65.0

1927

	Association No.	No. of Accidents	No. of Days Lost
Kansas	3	.0	.0
Houston	21	.2	4.3
Dallas	23	.3	5.7
Virginia	37	.4	9.9
Knickerbocker	55	.5	19.0
Alabama	78	.86	27.4
Indiana	89	.83	38.9
Cuba	79½	2.1	31.1
*Louisiana	100½	6.4	57.9
Argentine	110½	3.9	65.8
Uruguay	132½	15.9	228.0
		2.8	44.1

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*Louisiana operated last half of 1927.

1927—Cuba, Louisiana, Argentine and Uruguay not being listed in the Association report, are given numbers intermediate to regular numbers and properly classified from data supplied the New York Office.

industry, are convinced that it does from the results in our own plants. However, this answer was further confirmed in an investigation on Accidents and Production, by the American Engineering Council, and a report on such an investigation was presented before the meeting of the American Society of Mechanical Engineers, at the Spring meeting at White Sulphur Springs in May, 1927. The findings of this investigation was based on information from about 14,000 companies and show conclusively a distinct relation between accidents and production.

I am impressed with the interest the executives are taking. It reflects their belief that accident prevention is worth while, and their desire to be helpful to the men. Without the encouragement of the executives, accident prevention activities have a hard time of it in any mill. I have also been impressed with the awakening that has come to our superintendents and foremen, and it is a splendid sign to see the foremen voluntarily accepting more responsibility of this kind.

Our work has an additional value, incidental perhaps but nevertheless important. It is earning for us the respect and confidence of the public. Industrial publications regard reports of our accident prevention progress as important and give this news the prominence which it deserves. Even the daily newspapers publish current reports of our safety work, because they realize that the progress we are making is of public interest. Comments are not limited to the papers of the small cities and towns where the plants are located, but the leading papers of the country are giving splendid publicity to our work.

Popular interest in our accident prevention work is building popular respect for us among the public at large. The public is beginning to realize that the cement industry is taking active steps towards reducing accidents in mills and that it is working in the interest of its employees. It is beginning to realize that our mills are safe places in which to work—probably much safer than our streets and highways.

But let us not become self-satisfied with results. We still have accidents that must be avoided.

Accident prevention was first taken up as an important association function in 1913. Our efforts are being better organized from year to year. More and more interest is being taken by the member companies, and the interest of the employee has been aroused to a point where I confidently predict great improvements for the future. There are today in this country a total of 157 plants manufacturing portland cement—137 of these plants co-operate actively through the association in accident prevention work. These 157 plants are owned by 95 companies. Of these companies 80 belong to the association and, therefore, contribute not only by their interest in the work, but by financial support as well. There can be little doubt that the cement industry has developed to its present state of importance largely through co-operation expressed most forcibly by means of the association. The policy of the open door which has always prevailed with practically all the member companies has been a powerful factor in the tremendous growth and splendid advancement of the industry.

This same open door policy is to the advantage of members and non-members alike, and our organized efforts toward accident prevention reflect themselves to the benefit also of the men who work for the companies that enjoy the fruits of the association's efforts without being members and taking part direct in its work.

While we have made an excellent record in the past, we are looking hopefully to the future. We have proved to ourselves that accidents can be reduced, and during the coming years, we must show the industrial world that cement, which is one of the greatest human benefactors, making possible, as it does, safe roads and safe structures of many kinds, can be manufactured without accidents to those who labor to make it.

Atlas to Build $2,000,000 Plant in Texas

Construction to Begin Immediately on 1,000,000-Barrel Initial Unit

The Atlas Portland Cement Company will invade the Texas field with a mill of its construction, to be gotten under way immediately, according to an announcement by John R. Morron, president.

This is a revolutionary step for the Atlas company, which has not constructed a cement mill for many years. The expanding industrial life of Texas is expected to furnish a responsive market for the product. The territory is now being covered by the Independence, Kansas, mill.

Five to six hundred acres of land have been purchased for $51,000 near Waco, Texas, on which will be erected a plant costing $2,000,000 and having a capacity of 1,000,000 barrels. This will represent only the initial unit of a still larger plant.

The Atlas company now operates five plants—at Northampton, Pa., Independence, Kans., Hannibal, Mo., Leeds, Ala., and Hudson, N. Y.

Canada Company Shows Improved Sales and Earnings

A cheerful financial report emanates from Montreal, Canada, the home of the Canada Cement Company, which is now operating its nine plants at a high rate and whose sales and earnings are running considerably better than last year.

Stock listed on Montreal Stock Exchange comprises 210,000 shares 6½ per cent sinking fund cumulative redeemable preferred ($100 par) and 600,000 shares no-par common. Ahead of the capital stock the company has $20,000,000 5½ per cent first mortgage bonds outstanding. Three quarterly dividends of 1⅝ per cent each have been declared so far this year on the preferred, although no payment has been made on common. Listing application shows 5,132 stockholders hold 210,000 shares of preferred and 3,475 hold 600,000 shares of common.

Kentucky Cement-Making Materials Platted

The Kentucky Geological Survey has released the second of its regional cement material plats, a colored map of Miller's Creek, Estill County, Ky.

The cement plat is located adjacent to the Kentucky river a few miles above Irvine and Ravenna. Besides competitive river and rail transportation, large deposits of limestone and clay measured, contoured, cored and analyzed are presented. The field investigation and survey was carried forward under the direction of Dr. W. R. Jillson, the state geologist, by Withers R. Miller and Guy Briggs, Jr.

Buffington Plant to Have German Dust Collection System

The Universal Portland Cement Company is about to install a $1,500,000 dust collection system in its plant at Buffington, Indiana. The type to be used is of German origin and will be the first of its kind in this country.

MEN and MILLS

Notes from the Field

Former Pacific Superintendent Becomes Manager of Cebu

Harold M. Power, superintendent of the Pacific Portland Cement Company plant at Redwood City, Calif., since it was constructed several years ago, has resigned his position to become general manager for the Cebu Portland Cement Co. at Cebu, Philippine Islands. Mr. Power is succeeded by M. J. Johnson, former superintendent of the Pacific plant at Cement, Calif.

Mr. Power left for the East late in September for a three weeks visit to include cement plants en route. Upon his return he sailed from San Francisco for Manila, Japan and China, where he will inspect cement factories.

Mr. Power became associated with the Pacific Company in 1910. He was superintendent of the plant at Auburn, Placer County, Calif. After leaving this position to make a brilliant war record for himself, Mr. Power became superintendent of the Pacific Portland plaster plant at Mound House, Nevada. He spent a year there before being transferred to Auburn. In the course of another year he was sent to take charge of the cement plant near Suisun. He left there several years ago to assume the superintendency of the Redwood plant.

Upon leaving recently, Power gave to the first aid team of the plant a silver cup, in reward for the excellent showing made by the members, and was in turn presented with gifts by the men of the local plant.

Death Takes D. N. Armstrong

D. N. Armstrong, for many years vice-president and general manager of the Missouri Portland Cement Co., died suddenly in St. Louis on Thursday afternoon, October 18th.

Mr. Armstrong, who was in active charge of the manufacturing operations of the Missouri company and its predecessor, the Union Sand and Material Company, was well known throughout the entire cement industry, having taken an active part in the work of the Portland Cement Association and traveled extensively. He was, for three consecutive years, chairman of the association's committee on accident prevention and insurance, and in that capacity was responsible for many of the advanced practices to which the success of that work may be largely attributed.

Worker Retires from Coplay After 36 Years

One of its oldest employes in point of service was lost to the Coplay Cement Manufacturing Company on October 15th when Edward Moser, of Coplay, Pennsylvania, retired after 36 years of continuous service.

Mr. Moser served in the construction work on the company's first plant, Mill "A," and since that time has served the company in various capacities in the packing department of Mill "C" and during the past twenty odd years in various operations at Mills "B" and "C."

B. C. Wheeler Leaves Marquette

Bertrand C. Wheeler, who has been advertising manager of the Marquette Cement Manufacturing Co., Chicago and Memphis, for the past seven years and for the last year also manager, Super Cement division, has left to affiliate with "Chicago Golfer." In addition to participating in the management of the magazine, Mr. Wheeler will serve as advertising director.

Speech of Acceptance

By MAJOR HENRY A. RENINGER

Newly Elected President, National Safety Council

Having known the National Safety Council almost from its inception, its aims and ideals, I accept with a deep sense of responsibility the position of honor and trust as your president, appreciating fully the confidence your Executive Committee has imposed upon me.

May I ask for your generous and constructive support toward all of the efforts and activities of the Council.

Placed on a firm foundation by our past presidents, executive committees and loyal workers, we have built up in a comparatively short time vast responsibilities. No longer are we promoting safety in industry only. The work now of the National Safety Council through its various sections, local safety councils, committees, as well as individual personnel, touches every phase of life.

We are not only a National organization, but recognized internationally as the leader of the world in accident prevention work.

This summer I again visited the battlefields of France and was deeply impressed, after ten years of peace, with the hundreds of thousands of crosses in the poppy fields "over there." This was a terrible sacrifice of human life, but it was war.

Now, in time of peace, the annual toll in America due to accidents is 90,000 lives lost—an unnecessary sacrifice. After the experience of educating and training men for war, what a great satisfaction and happiness we have today in educating men, not to kill, but to save themselves and their fellowmen from needless destruction, pain and suffering!

The problem of the National Safety Council is the expansion of its present activities. Home, school and public safety programs must be more fully developed. This can only be accomplished, however, by an increased membership and income and through the generosity of public-spirited citizens.

Speaking for your officers, Executive Committee, Board of Directors and Council Staff, on whose shoulders rests the responsibility of this great movement, we accept it cheerfully, knowing that we have your hearty and loyal support, as well as the enthusiastic co-operation of the thousands of other safety workers throughout the country, whose influence is felt in their own communities.

After these ten years in active safety work, let me assert there is no better use we can make of our lives than to dedicate them to the great cause of Universal Safety.

As your president for the coming year, it will be my endeavor to give you the best I have, gladly, knowing that I have you all with me in active help to make Safety understood and appreciated throughout our country—to carry on the noblest task that can be given to any man or woman—the saving of human life.

Superior Finds Investment in Safety Pays

The Superior Portland Cement, Inc., has spent more than half a million dollars during the last three years to make the Superior plant at Concrete, Washington, as nearly safe as possible, with the result of a perfect record for three-quarters of this year.

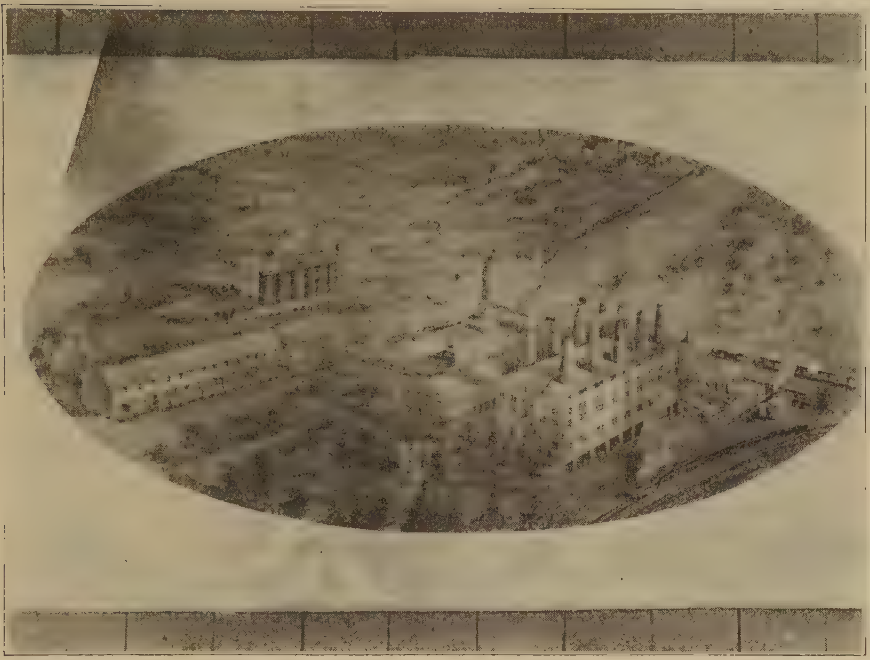
No loss-time accident has occurred in the company's plant since the first of the year. In 1926 workmen at Concrete lost 522 days from accident, and there were two fatalities. Last year the lost days were cut to 39, with only one fatality.

The record is vouched for by Vice-President C. N. Reitze, who is also general manager of the company. Mr. Reitze explains that one of the precautions taken was the digging of a bench on the face of the 400-foot face of the lime rock quarry. The bench operations are carried on by an electric shovel. Thus is eliminated much of the danger to workmen.

A further item in the half-million expenditure to make the operations safe includes complete electrical installation throughout the plant. The cost was approximately $100,000. Part of that cost includes what Mr. Reitze declares to be the largest electrical switchboard in any cement plant in the western United States.

The first-aid team of the Superior competed recently in a contest including other cement company teams of the Pacific Coast.

Clipped from Cement History Pages



Reproduced at the left is a copy of an old architect's drawing hanging in the office of the Coplay Cement Manufacturing Co., at Coplay, Pa. The mill in the background is Mill A, where the first cement in the United States was manufactured. The plant in the foreground is Mill B, where Shoeffer kilns are installed. The low shed on the extreme right, with the numerous smokestacks, was the drying room in which the "composition" was dried before it was placed in the kilns. The vertical metal encased "Anchor" kilns were then used to manufacture Anchor cement, a brand of natural cement

The illustration at the right shows the Schoeffer kilns at Mill B. The kilns were built in 1895

Importance of Uniformity in Electric Detonators

The importance of maintaining uniformity in the electric detonators used in mining and quarrying operations is emphasized by Dr. Charles E. Munroe, chief explosives engineer of the United States Bureau of Mines, Department of Commerce. It is evident that detonators are important elements in the explosive systems used in blasting with high explosives, and that their satisfactory and dependable behavior is essential to the successful operation of the system, Dr. Munroe points out.

Although quite small, these devices, and especially the electric detonators, being each composed of several elements, are complex. Thus there is the metallic capsule; the compressed charge, which is frequently a mixture of ingredients that must be compounded and compressed with great precision; the match, which may be of a simple or of a composite nature; the legs; the bridge; the solder, or other material, joining the bridge ends to the legs; and the plug. This complexity requires that especial care and great manipulative skill be exercised in the manufacture of these devices, and that there be especially rigid and searching factory supervision and inspection, to the end that the detonators and electric detonators offered in the market may be of strictly uniform and definite character. They should also be so made that this character may be retained over a long period of time, provided the detonators and electric detonators are packed, handled, transported, stored and used in accordance with approved practice.

To use electric detonators, there are required insulated leading wires to connect the legs of the detonators with the source from which the electric current employed to fire these detonators is to be drawn, and suitable circuit breakers to prevent the electric current from flowing through the bridge of the electric detonators until the shot firer desires it to do so. Though other means for doing so have been devised, detonators are, as a rule, fired by burning fuse which is ignited in the open.

It is obvious that detonators, with their accompanying fuse, are in first cost and in use cheaper than electric detonators, with their accompanying paraphernalia. There are too many operations, such as in bulldozing scattered boulders where detonators are to be preferred. Electric detonators, however, present a marked advantage over detonators in the greater assurance of safety in use that they afford. When detonators are used the fuse is ignited at the face of the blast and the safety of the shot firer depends mainly on the nimbleness and speed with which he runs to reach a place of safety, whereas, when electric detonators are used, the shot firer places the firing machine in a safe place, loads his boreholes, attaches the detonator legs to the leading wires, returns to the firing machine, untwists and couples on the leading wires, gives the warning signal and then fires from this safe place.

It is common practice in quarrying to arrange to fire a considerable number of charges at once. Thus in some cases twenty well-drill holes, staggered in two lines from the face of the quarry, will be driven to considerable depths from the top of the bench. These holes are so placed, and provided with such charges that when fired simultaneously each will do its assigned share of the work in bringing down the rock and breaking it up into the desired size. Operations such as these may be satisfactorily carried out by the use of electric detonators with which to initiate the explosion of the charge in each bore hole, provided the electric detonators used are of uniform character.

It will promote safety and efficiency, says Dr. Munroe, if electric detonators made by all manufacturers are not only, grade for grade, of the same efficiency, but that they conform to the same electrical standards.

301-Ft. Universal Chimney Highest in Chicago Industrial District

Erection of a monolithic concrete chimney, 301 ft. 6 in. high, the tallest in the Chicago industrial district, has just been completed at the Buffington, Ind., plant of the Universal Portland Cement Co. This chimney will eliminate a battery of small stacks now in use on the burner building of one of the mills at the plant. Powerful floodlights playing on the chimney will make it a landmark for night flyers and it is being listed as such with the Department of Commerce.

The chimney is built in connection with waste heat boilers and the most improved type of graded resistance Cottrell precipitator, which will eliminate a high percentage of dust from gases before they pass to the chimney.

The chimney is 26½ ft. in diameter at the bottom and 17 ft. at the top. The walls are 18 in. thick at the bottom and 6 in. at the top, while the foundation is 8 ft. thick at the center, and 3 ft. thick at the edges. A fully guarded steel ladder has been constructed on the outside of the chimney in 30-ft. sections, allowing resting places en route for persons climbing to the top.

The chimney was designed by the engineering department of the Universal company and the Rust Engineering Co., Pittsburgh, was the contractor.

British Coal Interests to Build World's Largest Cement Plant

In an address to over two thousand of his employees at the great Tilmanstone Colliery, Kent, England, Tilden Smith, managing director, recently said that before the end of the year they would start on the construction of the biggest cement works in the world, and set up an organization very soon which would enable them to supply the whole of London with electricity at one-half cent per unit.

New Plant Scheduled for Site Near Pittsburgh

The Davidson Coke and Iron Company has begun work on its new cement plant on Neville Island, 10 miles from Pittsburgh. Initial production of the 1,000,000 barrels scheduled per annum will be begun June, 1929. Provision is made to permit the increase of this capacity 50 per cent.

A by-product coke plant will also be constructed on the site.

Lehigh Stock Retired

The Lehigh Portland Cement Company on October 1st retired 7201 shares of preferred stock purchased at public and private sale. This is more than double the 1½ per cent of the maximum aggregate par amount of preferred issued to date, the amount which the company is obligated to retire and cancel. A regular quarterly dividend of 62½ cents a share on common stock was declared payable November 1st.

Ideal Pays Dividend

The Ideal Cement Company on October 1st paid a dividend of 75 cents on its common stock to those of record of September 15th.

Cement Statistics for September

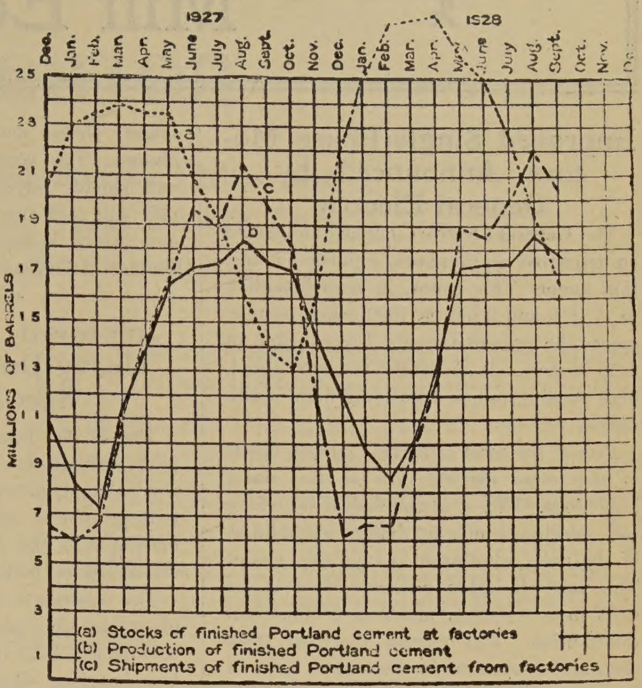
THE portland cement industry in September, 1928, produced 17,856,000 bbls., shipped 20,462,000 bbls. from the mills, and had in stock at the end of the month 16,722,000 bbls., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in September, 1928, showed an increase of 2 per cent and shipments an increase of 3.2 per cent, as compared with September, 1927. Portland cement stocks at the mills were 19.5 per cent higher than a year ago.

The statistics here presented are compiled from reports for September from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 159 plants at the close of September, 1928, and of 152 plants at the close of September, 1927.

Relation of Production to Capacity

	September 1928	September 1927	August 1928	July 1928	June 1928
	Per cent	Per cent	Per cent	Per cent	Per cent
The month	91.7	92.3	93.1	87.0	90.1
The 12 months ended	73.7	72.3	73.5	73.7	73.8



Production, Shipments and Stocks of Finished Portland Cement, by Months and by Districts, 1927 and 1928, and Stocks in August, 1928

Month	Production 1927	Production 1928	Shipments 1927	Shipments 1928	Stocks at end of month 1927	Stocks at end of month 1928
January	8,258,000	9,768,000	5,968,000	6,541,000	22,914,000	25,116,000
February	7,377,000	8,797,000	6,731,000	6,563,000	23,563,000	27,349,000
March	11,450,000	10,223,000	11,100,000	10,135,000	23,922,000	27,445,000
April	14,048,000	13,468,000	14,350,000	13,307,000	23,654,000	27,627,000
May	16,701,000	17,280,000	16,865,000	18,986,000	23,503,000	25,984,000
June	17,224,000	17,469,000	19,761,000	18,421,000	20,972,000	25,029,000
July	17,408,000	17,445,000	18,984,000	19,901,000	19,397,000	22,580,000
August	18,315,000	18,730,000	21,411,000	21,970,000	16,292,000	*19,328,000
September	17,505,000	17,856,000	19,828,000	20,462,000	13,996,000	16,722,000
October	17,174,000		18,105,000		13,141,000	
November	14,449,000		11,619,000		16,022,000	
December	11,999,000		6,200,000		22,082,000	
	171,908,000		170,922,000			

District	Production—September 1927	Production—September 1928	Shipments—September 1927	Shipments—September 1928	Stocks at end of month 1927	Stocks at end of month 1928	Stocks at end of Aug., 1928*
Eastern Pennsylvania, New Jersey, Md.	4,058,000	3,601,000	4,596,000	4,141,000	3,494,000	4,984,000	5,524,000
New York and Maine†	1,273,000	1,205,000	1,468,000	1,355,000	1,170,000	1,273,000	1,423,000
Ohio, Western Pa., and West Virginia	1,804,000	2,267,000	2,352,000	2,559,000	1,735,000	2,155,000	2,447,000
Michigan	1,692,000	1,573,000	1,869,000	1,991,000	1,080,000	879,000	1,297,000
Wisconsin, Illinois, Indiana, and Kentucky	2,472,000	2,401,000	2,564,000	3,085,000	1,139,000	1,283,000	1,967,000
Virginia, Tenn., Ala., Ga., Fla., and La.	1,471,000	1,433,000	1,490,000	1,475,000	1,126,000	1,634,000	1,676,000
Eastern Missouri, Iowa, Minn., and So. Dak.	1,481,000	1,735,000	2,014,000	2,236,000	1,204,000	1,572,000	2,073,000
Western Missouri, Nebraska, Kansas, Okla.	1,033,000	1,201,000	1,187,000	1,270,000	1,314,000	1,153,000	1,222,000
Texas	487,000	544,000	466,000	524,000	272,000	231,000	211,000
Colorado, Montana, and Utah	174,000	321,000	249,000	316,000	384,000	387,000	382,000
California	1,200,000	1,124,000	1,214,000	1,102,000	704,000	768,000	746,000
Oregon and Washington	360,000	451,000	359,000	408,000	374,000	403,000	360,000
	17,505,000	17,856,000	19,828,000	20,462,000	13,996,000	16,722,000	19,328,000

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*Revised. †Maine began producing April, 1928, and shipping May, 1928.

Mill Equipment

Improved Single-Phase Motors Announced by General Electric

The General Electric Company announces an improved single-phase, repulsion induction motor. This motor, in sizes including ¾, 1, 1½ and 2 h.p. at 1800 r.p.m., supplements the present General Electric line of SCR motors. It is of the constant-speed, high starting torque type for general application.

One of the most important improvements is the more efficient use of the stator punchings. This is accomplished by taking full advantage of the design possibilities of the polar winding of a repulsion motor. The most desirable distribution of stator coils in a repulsion motor is a sinusoidal distribution. This means, therefore, that the number of turns in the various coils of any one pole vary according to the angle from the pole center. Full advantage has been taken of this possibility by designing a four-pole motor using a square punching with graded slot depths, the slots being so arranged that the deep slots are placed at the corners where the maximum core is available and with the shallow slots placed in the flat portion of the punching where the minimum core is available.

As a result of this modification the active core section is unusually large, permitting a design of low flux density and larger bore. As a motor's output is a function of the square of the rotor diameter and the length, it is therefore possible to design a motor with small overall length. Combined with this change in design a modification has been made in the commutator and brush rigging design so that the commutator end shield has the same dimensions as the pulley end shield, thus giving the motor a symmetrical appearance. The motor is equipped with phosphor bronze, waste-packed bearings of the same size at both ends.

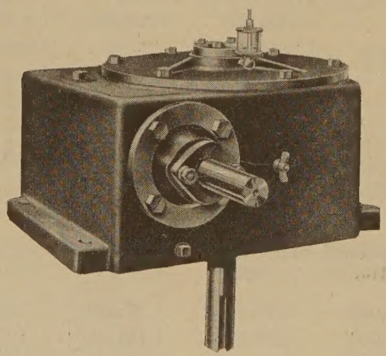
The motor is enclosed except for ventilating openings in the lower portion of each end shield. Air is drawn through the ventilating openings at the pulley end by means of an internal fan, passes around the stator laminations and out through the ventilating openings in the commutator end. This construction makes a practically enclosed motor and provides complete protection against falling particles and splashing water. In spite of this, and the small size of the motor, it is designed to operate within a temperature rise of 40 deg. C. This materially broadens the field of application, permitting the use of a standard 40-deg. motor in many cases where only a larger, closed motor would otherwise be chosen. The ventilating openings in the end shields have been so designed that they will meet the requirements of the various safety bodies for protection against accidental contact, the manufacturers say.

Improved Vertical Type Heavy Duty Worm Gear Speed Reducer

The D. O. James Manufacturing Company, Chicago, has announced an improved vertical type heavy duty worm gear speed reducer that is made to allow for vertical driving with the drive shaft projecting at either top or bottom.

The housing is of high grade gray iron, of ample size, provided with a large oil cooling and heat radiating chamber. Timken bearings support both sides of the gear shaft. The worm shaft is mounted on double Timkin bearings on one side and Norma Hoffman roller bearings on the other.

Gear shafts are .40 carbon steel, ground to size, and made oversize to withstand emergency strains and starting loads. Worms are made integral with worm shafts of S. A. E. 3140 chrome nickel steel, generated, heat treated, ground and fully relieved. Gears are made of high grade phosphor bronze, the larger sizes made up of a bronze ring, shrunk on and keyed to a cast iron spider.



Twenty degree to 30 degree pressure angle teeth are standard, depending on the number of teeth in the worm and gear, and all gears are made with amply wide faces.

The James vertical heavy duty worm gear speed reducer applies particularly well on equipment that rotates on a vertical axis. The expense and delivery delay of vertical type motors are entirely eliminated by using a vertical type unit where conditions warrant a drive of this type, the manufacturer says.

Seek to Perfect "Hill Tubular" Slurry Agitator

The Hill Clutch Machine and Foundry Company, Cleveland, Ohio, has in the process of construction and emerging from the experimental stage the Hill Tubular agitator. The design now being used includes a cylindrical instead of a conical-shaped tube and a variable pitch marine type propeller in place of a constant pitch angular propeller.

The Hill Company claims the following four advantages for the agitator:

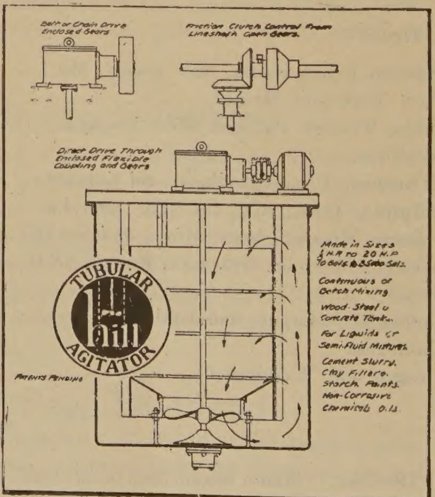
The marine propeller does not develop eddy currents, turbulence or violent local agitation. Power, it is said, is expended only in producing a smooth flowing current through the propeller throat sufficient to overcome the skin friction of the tank and tube.

The mixing time is short. The combination of inter-mixing and circulation starts immediately throughout the entire volume.

Uniformity of mix is insured by instant circulation and mixing with no dead areas in the tank and an absence of segregation, precipitation, or deposits.

Intermittent operation is possible. Power need be applied only for short intervals before use except when used in continuous process tanks. A slurry correction tank can stand over night and within fifteen minutes after starting complete uniformity of the mixture is reached. Heavy deposits which have not completely solidified are immediately cleaned up from the bottom.

Several "Hill Tubular" units, mounted on a revolving bridge, it is said, will properly agitate a slurry basin of any size. Single units are primarily designed for installation in separate relatively small correction tanks.


Belt or Chain Drive Enclosed Gears
Friction Clutch Control From Lineshaft Open Gears.
Direct Drive Through Enclosed Flexible Coupling and Gears
Made in Sizes ½ H.P. to 20 H.P. 70 Gals. to 35000 Gals.
Continuous or Batch Mixing
Wood. Steel or Concrete Tanks.
For Liquids or Semi-Fluid Mixtures.
Cement Slurry. Clay Fillers. Starch. Paints. Non-Corrosive Chemicals. Oils
TUBULAR
hill
AGITATOR
Patents Pending

Heine Waste Heat Boilers at Weirton

Heine Boilers Are Installed to Utilize the Waste Gases from the Open Hearth Furnaces at Weirton Steel Company

The engineers of the Weirton Steel Company were recently called upon to meet an increase in their steam load due to blast furnace and other plant extensions. There was some blast furnace gas available but not enough to furnish all of the heat required for steam making. There was an additional source of heat, however, in the hot gases going to waste up the open hearth stacks.

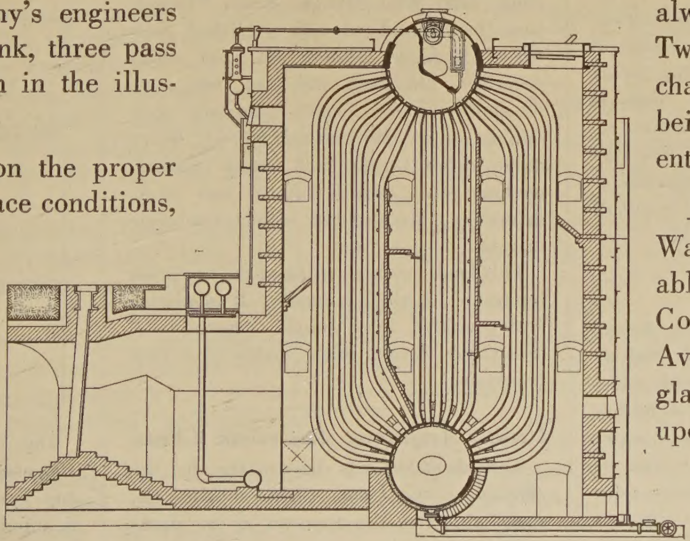
The engineers from several boiler manufacturers were called in. The Weirton engineers explained that the gas ducts leading from the open hearth furnaces to the stacks could not be moved. Neither could the stack. Neither could the operating floor be disturbed. The boilers must fit into a given floor space, and a given headroom in such a way that the existing stack and flue could be utilized. Furthermore, the units were to furnish superheated steam.

The engineers of the Heine Boiler Company made an inspection of the boiler site. This indicated that only some vertical type of boiler could be used. The gas temperatures required the superheater location to be in the gas duct just ahead of the boiler, and, the stack and fan location permitted only a top gas outlet. The recommendation of the Heine Boiler Company's engineers was a two drum, three bank, three pass bent tube boiler as shown in the illustration.

Having determined upon the proper type of boiler to fit the space conditions, the next step was to proportion the heating surface and gas passes to fit the gas quantities available to locate the baffles and design and locate the access and cleanout doors. Since a waste heat boiler absorbs heat by convection only, it was important that a uniform and high gas velocity be maintained throughout the boiler, and that all of the heating surface be swept by the hot gases. The boiler tubes were accordingly arranged in three banks of seven, six and five tubes located in the order given from the inlet toward the outlet of the boiler, and, the baffle arrangement shown in the illustration was employed.

The water was fed into the upper drum on the rear bank or exit gas side. A diaphragm was provided to divide the drum, causing a true counter flow of feed water and gas in the rear tube bank and at the same time adding two 180° turns to the steam liberated in the front and middle tube banks. This feature and the dry pipe purifier insured dry steam.

Air tight settings are even more important in waste heat boilers than in direct fired installations, due to the higher draft carried. An airtight steel casing was designed which could be erected in the field without riveting. Access and cleanout doors were provided with ground seats and faces and universally hinged so that the faces and seats would always be in true alignment. Two of these units were purchased in 1926. A third is being installed at the present time.



An interesting folder on Waste Heat Boilers is available. The Heine Boiler Company, 200 Madison Avenue, New York, will gladly send you a copy upon request.

With the Manufacturers

INDUSTRIAL LITERATURE

Bates Bag Publication

"*No Loss From Mill to Mixer*" is the title of a small 12-page booklet just published by the *Bates Valve Bag Corporation*, Chicago. It portrays the structure of the bags, their use, and wearing, waterproof and handling qualities. A short description accompanies each illustration.

Merco-Nordstrom Catalog

Catalog 6 has just been issued by the *Merco Nordstrom Valve Company*. This is a 144-page publication, having contents indexed on Page 4. Sectional views and full photographs accompany the cataloging of these products.

Locomotive Publication

The Mid-West Locomotive Works, Hamilton, Ohio, has published a 24-page book devoted to its gasoline locomotives. The initial pages bear illustrations of a variety of models of locomotives. On the succeeding pages are found letters of approval from satisfied owners and photographs of actual installations, followed by two pages of specifications.

What Fahralloy Is

Fahralloy for Every Heat and Corrosion Resistant Purpose" is a 20-page booklet going into the history and early manufacture of the nickel and chromium alloys known as *Fahralloy*, as well as the still earlier experimentation in them. Farther on is told something of what the alloy is, what it does, and how to use it.

Fahralloy, according to this publication, is the name given to a series of alloys, at present thirteen in number, having nickel and chromium in their analyses. Each is made to fit some particular condition requiring a metal whose properties offer the utmost possible heat corrosion resistance.

The publication comes from the *Southern Manganese Steel Co.*, St. Louis, Mo.

On Misfires

"*Prevention of Misfires*" is an 8-page publication prepared by *E. I. duPont de Nemours & Co., Inc.* It deals with many common and uncommon causes of misfire in several methods of blasting and states briefly how each of these causes can be eliminated. Remarks in parentheses refer to the latest edition of the company's "Blasters' Handbook," which explains the processes recommended more fully.

Blame for the majority of misfires is laid to damage to the explosives or firing devices through improper storage or handling or to improper blasting practices. Where necessary operations are illustrated.

Manganese Steel History

A quickly digested summary of manganese steel and its high points is contained in a 20-page pocket-size brochure entitled "*The Manganese Steel*," published by the *American Manganese Steel Company*.

Its composition, functions, and a history of both the industry and the steel, is included in the publication, making the latter of particular interest to engineers and buyers of alloy steel parts.

Celite Lecture

The Celite Products Company, Los Angeles, has reprinted the 1928-29 lecture on "*High Temperature Insulation*," designated as *Bulletin* 104. This is in a form to be presented before the engineering schools of universities.

Changes over the lectures of previous years are that conductivities of refractory, red brick and insulating materials have been determined based on mean temperatures of test specimens, and a new method of determining heat loss through walls is included. Illustrations show the late application of insulation to modern high temperature equipment.

NOTES FROM THE FIELD

Covering Speed Reducers

The D. O. James Manufacturing Company, 1120 West Monroe street, Chicago, have just completed and published their *Speed Reducer Catalog No. 166* which describes, illustrates and lists every type of speed reducer made—planetary spur (direct, angle and vertical drives), heavy duty worm (direct and angle drives), medium duty worm (direct and angle drives) and herringbone (direct and angle drives).

This book has been planned for engineers interested in speed reducers. It is written and compiled in a simple, concise, well illustrated form which makes for easy reference.

Union Acquires American Chain

Announcement has been made by the officials of the *Union Chain & Mfg. Co.* that, subject to the approval of the stockholders, they have acquired control of the *American High Speed Chain Company* of Indianapolis, Ind., and will combine the two companies.

The products of the two companies supplement each other and as a result of the union of interests, the Union Chain & Mfg. Co., preserving its identity, will be in a position to manufacture and market, to users of such equipment, a complete line of steel sprocket chains.

As soon as the approval of the stockholders is had, and other necessary details are completed, the machinery and equipment of the American High Speed Chain Company will be moved immediately from Indianapolis, Ind., to the Sandusky plant of the Union Chain & Mfg. Co., a new unit having been provided to permit the proper installation of such equipment.

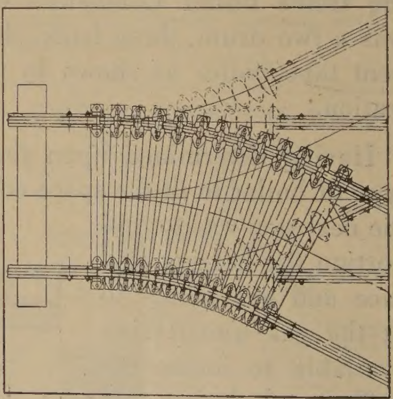
Two executives of the American High Speed Chain Company, J. C. Howe, president, and W. A. McCosh, vice-president, will move to Sandusky and become a part of the new organization.

The executives of the company will be: Fred Emmons, president and treasurer; J. C. Howe, vice-president; Walter Hay, vice-president; E. F. Emmons, secretary.

MILL EQUIPMENT
(Continued)

Reach the Wide Places with Flexible Rail

Wide places may be easily cleaned up with a single track if its Clarkson flexible rail is used, the Illinois Power Shovel Company, Nashville, Illinois, states. This device was originally designed to enable a track-mounted machine to clean up a wide room.



The "rail" shown in the illustration is composed of small cast-steel sections with stop ears attached, which rest in chairs mounted on cross ties. Upon moving the track the inside sections contract and the outside lets out, forming a uniform curve.